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AN EVALUATION OF GROWTH MONITORING

IN ~~THREE CHILD HEALTH PROGRAMMES IN~~ ZAIRE

by

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ABSTRACT

Growth monitoring has become a major component of most child health programmes in developing countries over the past two decades. The rationale for this activity is discussed and examined critically in the light of the evidence from previous studies and from a detailed evaluation of three child health care programmes in rural Zaire which included growth monitoring. The monthly sessions to which mothers brought their children were observed, the health workers were interviewed, and information was obtained on programme costs, supervision, and health records in all three programmes. A survey of the knowledge and practices of 547 mothers of children under five years of age was carried out in one programme's catchment population.

A total of 497 consultations were observed in the three programmes as part of the evaluation. The consultations lasted between 30 seconds and five minutes each, with a mean of two minutes. Mothers and children spent three to eight hours at the clinic in order to receive these brief consultations, ten minutes of group health education, and if necessary, immunizations. Whilst staff measured and recorded weights accurately, they failed to take any specific actions in one-third of children who had growth faltering. Similarly, no counselling was given to one-third of mothers whose children were ill and/or had growth faltering, called "at-risk" children. Generally, the quality of advice and referral for illness was more satisfactory than the nutritional advice given mothers, which consisted of brief, standard directives. The at-risk children did not always receive special consultations by better-qualified staff.

A household interview survey of 547 mothers of children under five assessed their understanding of the growth charts and their knowledge and reported practices with regard to child feeding and diarrhoea. Results showed that knowledge and practices improved with increased attendance at growth monitoring sessions, after controlling for the mother's educational level, tribe, socio-economic level and parity.

Since nearly two-thirds of children attending the sessions were classified as at-risk, the value of individual screening by weighing is questionable. Not all at-risk children received interventions; of those who did, the quality of the interventions was frequently inadequate. Policy and programme recommendations for growth monitoring in child health programmes are described, and research needs identified.

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CHAPTER 1

INTRODUCTION

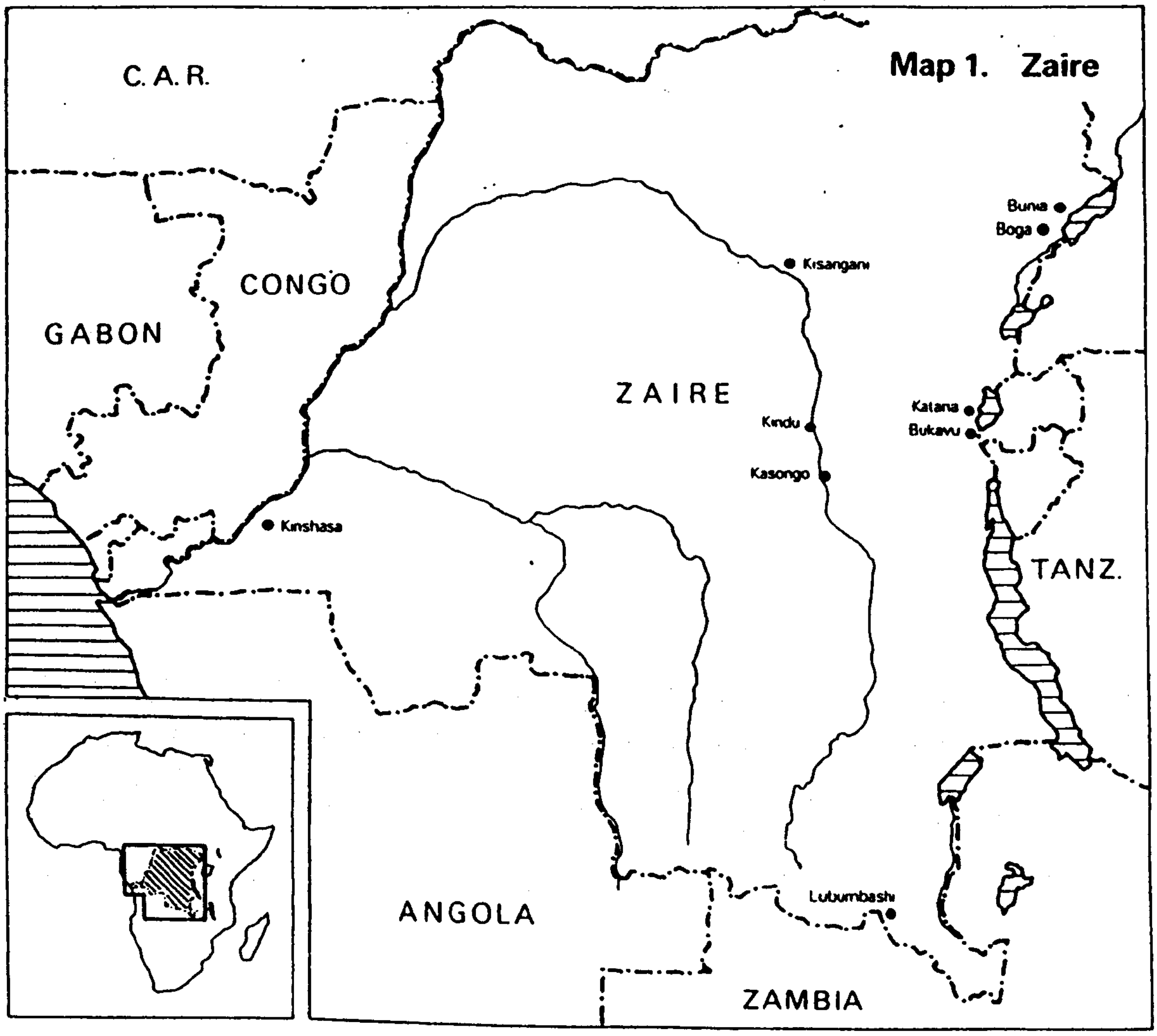
Growth monitoring refers to the regular measurement of children's growth, usually by weighing, and the recording of the measurements on a growth chart. The measurements provide information to mothers and health workers which can form the basis for a range of responses aimed at promoting the growth and health of children. Growth monitoring is used by many child health programmes in developing countries as a basic screening method to focus interventions on children who have faltering growth, and as an educational and motivational tool for engaging in a dialogue with mothers and/or communities on child health problems.

The history of growth monitoring programmes goes back at least to 1910, when a baby weighing programme was carried out in Jamaica. The Infant Welfare Movement in the U.K. in the early 1920s used volunteers to weigh babies and provide advice on child rearing to mothers (*Rohde* 1988b). The concept of the "under-fives" clinic was popularized in the 1960s by the experience of David Morley and colleagues in Nigeria, who developed a growth chart which was easier to use than previous versions, and made regular weighing the corner-stone for assessment and treatment of under-fives (*Morley and Woodland* 1979). In the 1970s and 1980s, research improved knowledge of normal growth and the understanding of the relationships between growth, morbidity and mortality (*Kielmann and McCord* 1978, *Chen* *et al* 1980, *Tomkins* 1981, *Mata* 1983). One of the largest and best-documented government programmes to use growth monitoring was started in Indonesia in the early 1970s, involving a major effort to shift responsibility for growth monitoring from the health service to communities. When Unicef announced GOBI (growth monitoring, oral rehydration, breast-feeding and immunization) as its operational strategy in 1982, the use of growth monitoring as a basic strategy for child health programmes was given an important impetus in developing countries.

Although the usefulness of focussing health efforts on young children is not seriously challenged, the importance of individual growth surveillance is controversial. The first comprehensive review of operational experience of growth monitoring was published in 1985, based on the results of large, mainly Asian, programmes (*Gopalan and Chatterjee* 1985). Reflecting the uneasiness of many health professionals, the review questioned the rationale and effectiveness of the strategy. Criticisms focussed mainly on the poor implementation of growth monitoring activities in many programmes, but other, later critiques have also highlighted the lack of empirical data to support some of the basic assumptions underlying growth monitoring and the implications to the health service of the introduction of growth monitoring in child health programmes (*Save the Children Federation* 1986, *Hendrata and Rohde* 1988, *Nabarro and Chinnock* 1988).

These criticisms, coupled with the increasing promotion and financing of growth monitoring activities (mostly by donor agencies), and the realization that little factual information was available from Africa, prompted the author to undertake a study of growth monitoring in Zaire. The scope of the study included a review of the use of growth monitoring in clinic-based child health programmes in three health zones in eastern Zaire. The largest towns in the zones -- Boga, Kasongo and Katana -- are shown on the map of Zaire (Map 1). The monthly sessions to which mothers brought their children were observed and the health workers involved were interviewed. Information was also collected on the context of the child health programmes, including both the socio-economic situation of the population and relevant aspects of the health system in which the programmes operated. In one programme's catchment area (the Boga Health Zone), a population-based interview survey of mothers of children under five years of age was carried out to determine the associations between the programme and mothers' knowledge and practices in child care and their children's anthropometric status.

All three health programmes were mainly financed and managed by expatriate organizations. It was not possible to find a government-run programme which was sufficiently active to allow the programme to be easily observed. Studying only non-governmental programmes had the disadvantage of not allowing the author to comment on growth monitoring which is conducted under routine government service conditions; whether it can be effective under such conditions is an important criterion for assessing the likely long-term viability of the strategy for child health programmes. However, it did allow the evaluation of the potential of growth monitoring under the favourable conditions of extra financing and management without some of the usual government constraints. It should be noted that the per capita budgets for the health service in two of the systems studied (Boga and Kasongo) were modest, not beyond what many governments could afford. Also, the growth monitoring activities in all three areas were financed to a large extent by payments from the population. The conditions under which the three child health programmes had to operate were sufficiently similar to those of many other non-governmental programmes in developing countries to make the findings and conclusions of relevance to them and perhaps even to many government programmes as well.


Map 1. Zaire
C. A. R.
CONGO
GABON
ZAIRE
Kisangani
Bunia
Boga
Katana
Bukavu
Kindu
Kasongo
Kinshasa
TANZ.
ANGOLA
ZAMBIA
Lubumbashi

CHAPTER 2
GROWTH MONITORING: A REVIEW

In common with other health programmes, emphasis has shifted in nutrition from the treatment of established malnutrition -- costly, difficult and often unsuccessful -- to its prevention by the promotion of healthy growth. There are two fundamentally different operational strategies for promoting growth through the use of growth monitoring. In the first strategy, growth monitoring is a health service-based activity used as a screening method to provide therapeutic services to individuals. In the second strategy, it is a community-based participatory activity used to promote behavioural change by better-informed mothers which, eventually, will encourage comprehensive community actions designed to ameliorate the fundamental causes of poor health. Sections 2.1 to 2.5 of this chapter examine the rationale and objectives behind these two operational strategies. In Sections 2.6 to 2.12 the successes and problems of growth monitoring programmes in reaching their objectives and the costs involved are discussed.

2.1 Screening for Growth Deficit

Screening tests are designed to discriminate between people who are likely to have a disease and those who are less likely to have it. Screening is useful only if the clinical outcome for persons identified by the screening is better than it would have been if the persons had not been screened. Usually the benefits are attributed to the increased effectiveness of treatment for early-stage disease (*Frank* 1985). The potential value of screening by anthropometry lies in its ability to predict a child's risk of future morbidity and mortality, so that steps can be taken to prevent this occurring.

2.1.1 *Anthropometric measures of nutritional status*

Although nutritional status cannot be measured directly, it can be indirectly assessed by anthropometric, clinical, and biochemical indicators. Of these, anthropometry is considered the most practical indicator to use. Regular measurement of weight-for-age is the fundamental screening mechanism used in most programmes: health workers and mothers can learn to weigh accurately, the concept of weight gain is easily understood, and it is a good indicator of both acute and chronic malnutrition (*American Public Health Association* 1981, *Arole* 1988). Height measurement is time-consuming and there are considerable difficulties in ensuring accuracy; it is therefore more suitable for assessing wasted children in emergency situations, or as a measure of programme impact (*Unicef* 1983, *Mason et al* 1984). Arm circumference is simple to perform and does not require accurate age determination because the mean change in arm circumference is only 1.5 cm. between 12 and 60 months. It is useful for targeting food rations in emergency situations, but is not commonly accepted for regular monitoring, although some researchers attest to its sensitivity, ease, accuracy and low cost (*Nabarro* 1982, *Velzeboer et al* 1983, *Briend et al* 1987).

Growth is usually assessed against international or local reference standards. International reference growth standards were defined in 1977, based on North American standards developed by the National Center for Health Statistics (NCHS). These were based on the growth of predominantly formula-fed infants and may not be appropriate for exclusively breast-fed infants (*Serdula and Seward* 1987). Although Goldstein and Tanner (1980) have argued that local standards are preferable for screening poorly-growing children because they could take into account genetic and ethnic differences, most studies which compared privileged and under-privileged children within a population have shown that social factors rather than genetic factors or ethnic background were primarily responsible for group differences (*Janes* 1974, *Habicht et al* 1974, *Stephenson et al* 1983). A further advantage of international standards is that they allow comparison between programmes and populations over time. Finally, it requires an extensive effort to establish valid local standards; a minimum of two hundred children in each age and sex group are required to form a reference population (*Waterlow et al* 1977). In the absence of local standards for most programmes, international standards are widely used. Graitcer and Gentry (1981) suggested a compromise by combining international standards with different cut-off points which are appropriate to local resources and to the relationship of growth to morbidity and mortality in that country (assuming that is known).

Cut-off points for defining grades of malnutrition were first based on the Gomez classifications of 60%, 75% and 90% of the median using the Boston standard for weight-for-age (*Gomez et al* 1956). The Wellcome classification modified this by adding a criterion of oedema to differentiate between marasmus and kwashiorkor (*Waterlow* 1972). Seoane and Latham proposed in 1971 that a deficit in height-for-age be used as an indicator of past malnutrition and weight-for-height as an indicator of current, acute malnutrition, called "stunting" and "wasting" respectively (*Waterlow* 1972). A wide range of classifications of growth and malnutrition have been developed. Table A1 shows the most commonly-used classifications and cut-off points to define malnutrition.

2.1.2 *Growth deficit and mortality*

Protein-energy malnutrition (PEM) is one of the most important health problems affecting children in the world. A community-based study in Bangladesh showed that 44.6% of deaths in the Matlab area were "nutrition-related" (*Chen et al* 1980). Nutritional deficiency was present in 47.1% of deaths reported in the inter-country study in the Americas (*Puffer and Serrano* 1975), although all deaths had been attributed to specific diseases rather than to malnutrition. The classical hospital-based studies in Mexico by Gomez et al (1956) showed that children under five who were below 61% of the median weight-for-age had a 33.5% risk of dying within two weeks of measurement, while those between 61% and 90% of the median had a risk of 22.6%. The report of this study did not provide information on the mortality of children of normal weight. Thirty years later, there are relatively few population-based studies on the relationship between anthropometric status and mortality. Table 2.1 summarizes the results from the most important studies.

Kielmann and McCord's study showed that weight-for-age predicted mortality most strongly in the six months following assessment, with mortality doubling on average with each 10% decline below 80% of the Harvard median. In contrast to this study, Chen et al (1980) found a threshold effect for mortality in a similar group: severely malnourished children experienced a two-fold higher risk of dying over a 12-month follow-up period than all other children, and a four-fold risk during the second 12 months of follow-up. Studies in Senegal reported in 1986 found marked differentials in mortality between well nourished and severely malnourished children (*Serdula and Seward* 1987). The Kasongo Project Team (1983) reported there to be no differential mortality risk among children under five in a rural population in Zaire in contrast to the Senegalese study and the studies from Asia. However, using the local population as the reference population, the data showed nine deaths from the group below the third percentile weight-for-age compared to 86 deaths from the other 97% of the population, giving a relative risk of almost 3:1 (*Kasongo Project Team* 1983, Table 1, p. 70).

Table 2.1
POPULATION-BASED STUDIES OF THE RELATIONSHIP OF ANTHROPOMETRIC STATUS TO MORTALITY IN CHILDREN

Country and Study	*Age at Assessment*	*Follow-up Period*	*Reference Population and Indicator*	*Groups Compared*	*Relative Risk*	*Sensitivity/ Specificity*
Bangladesh: Sommer and Loewenstein 1975	1-9 yrs	18 mo.	*Local (reference population:)* arm circumference for-height	<=9th centile/ >50th centile	3.4	N.A.
India: Kielmann and McCord 1978	1-35.9 mo.	12 mo.	*Harvard:* weight-for age	<60% of median/ >=80% of median	10	N.A.
				60-69% of median/ >80% of median	5	
				70-79% of median/ >80% of median	3.75	
Bangladesh: Chen et al 1980	13-23 mo.	23 mo.	*Harvard:* weight-for-age	<60% of median/ >=60%	2.8	42.9%/ 80.1%
			height-for-age	<85% of median/ >=85%	3	47.3%/ 78.25
			weight-for-height	<70% of median/ >=70%	2.8	9.8%/ 96.6%
Zaire: Kasongo Project Team 1983	6-59 mo.	100 days	*Harvard:* weight-for-age	<60% of median/ >=60%	3.3	N.A.
			Local: weight-for-age	<10th percentile/ >=10th	2.2	20%/ 90%
			weight-for height	<10th percentile/ >=10th	1.8	16.3%/ 91%
			arm circumference-for-height	<10th percentile/ >10th	2.7	23%/ 89%
Senegal: Garenne 1986	0-59 mo.	6 mo.	*NCHS:* weight-for-age	<60% of median/ >=95%	9.8	N.A.
			height-for-age	<87.5% of median/ >=95-104%	2.4	
			weight-for-height	<70% of median/ 95-104%	13.6	

Sources:
Kielmann and McCord 1978, *Serdula and Seward* 1987.

The Kasongo study also analyzed the association between weight velocity and death in the 100 days following assessment. Decelerations in weight-for-age of one SD or more (NCHS references) over a two-to four-month period were measured. Children in the 25-59 month age-group with decelerations of one SD unit or more were 6.5 times more likely to die than children with no such deceleration. The comparable rate for children aged 6-24 months was 1.2 (*Kasongo Project Team* 1986). The positive predictive value was low, because death was a rare event: for every correctly identified child at-risk, there were 25-50 false positives (*Van Lerberghe* 1987). The relationship between growth velocity and mortality was also studied by Bairagi (1981) in a Bangladeshi population. For children who died, mean weight velocity in the two-month interval before death was negative, compared to the previous two-month interval, but the difference was not significant ($p=.10$). Weight velocity and attained weight were not compared for their ability to predict mortality. Neither this nor the Kasongo study accounted for the child's anthropometric status at the time of growth deceleration in calculating mortality risk.

Although few studies have analyzed the relationship between growth velocity and mortality, much effort has been expended in trying to persuade health workers to shift from screening by attained weight to screening by weight velocity. Both measures provide useful information. A low attained weight is a proxy for either long-term or numerous episodes of previous growth deceleration, while reduced growth velocity is a reflection of current infection or other stress. Thus the information from growth monitoring identifies both episodes of risk and children at risk (*Van Lerberghe* 1987).

2.1.3 *Growth deficit and morbidity*

Malnutrition in children in developing countries is usually due to a combination of poor dietary intake and frequent and severe infections. Other factors which have been shown to be associated with malnutrition and mortality probably act by altering dietary intake, increasing infections, or both. These factors include social, economic, demographic and cultural variables such as the ability to produce or purchase sufficient high-quality food, environmental sanitation, beliefs and practices related to child care, the time and energy of women for child care, birth intervals, parity and age of mothers, and access to preventive and curative health services (*Brown and Brown* 1977, *Mosley and Chen* 1984, *Serdula and Seward* 1987).

Mata (1983) believes that infections, especially diarrhoeal, are more important than lack of food in causing malnutrition. Diarrhoeal diseases clearly retard growth, while respiratory infections usually do not; growth retardation is also associated with other infections such as measles and malaria (*Rowland et al* 1977). The interactions between infection and malnutrition are fairly well known. All infections adversely affect nutrient metabolism and utilization, whilst diarrhoeal diseases also affect nutrient absorption and speed the intestinal transit of food (*Martorell et al* 1975). The child's appetite is reduced, specially in diarrhoeal episodes, and cultural practices may restrict the child's diet to no food or inappropriate food (*Scrimshaw et al* 1968). Both humoral and cellular resistance to infection is diminished, even in mildly malnourished children (*McMurray* 1981).

The evidence as to whether diminished immunocompetence affects the frequency or severity of infections is ambiguous. Tomkins (1981) and Delgado et al (1983) found that wasting was associated with a greater incidence and duration of diarrhoeal infection. However, confounding factors affecting incidence that were not taken into account were exposure to infection and socio-economic status, which are themselves associated. The greater frequency of diarrhoea in malnourished children was likely to have been related more to increased exposure to pathogens than to nutritional factors. Most investigators have found an association between the severity and duration, but not incidence, of diarrhoea or respiratory infections and anthropometric status as measured by weight-for-age (*James* 1972, *Black et al* 1984). Moderately malnourished children with their diminished immunocompetence appear more likely to develop severe infections which in turn result in poorer nutritional status and higher case-fatality rates (*Martorell and Ho* 1984, *Martorell and Sharma* 1985).

The other major factor in malnutrition is dietary intake, mainly through breast feeding and weaning practices. Breast feeding protects against malnutrition by providing a high quality food which is uncontaminated and contains immunogens specific to the child's environment (*Mata et al* 1983, *Jason et al* 1984). Weaning foods are often poor in quality and quantity and are heavily contaminated, increasing the risk of infection. Other factors affecting intake include infrequent feeding, food taboos, and the acceptability of the food offered (*Martorell et al* 1984, *Martorell et al* 1985). Economic and social factors are obviously important determinants of child care, but given the same resources and constraints, maternal decision-making can also significantly affect children's health and nutrition status. For example, Dettwyler (1986) found in Mali that small differences in mothers' attitudes towards infant feeding and medical care of sick children had important effects on nutritional status, in spite of extreme poverty in the group studied.

Studies of the interaction between nutrition and mental and psychomotor development have shown that severe marasmus during the first year of life seems to result in a persistent deficit of intellectual function, whereas kwashiorkor, which usually occurs in the second year of life, does not. The more unfavourable the socio-economic conditions are which interact with malnutrition, the more deleterious the effect on mental development (*Brozek* 1982).

2.1.4 *The usefulness of anthropometric screening*

Growth monitoring is better than clinical judgement at detecting both clinical and subclinical malnutrition, and -- if done frequently -- it can detect growth faltering reasonably early. Weight-for-age and arm circumference appear to be the best indicators of subsequent short-term mortality, as they show the highest sensitivity at a high level of specificity. Overall, the sensitivity of anthropometry for predicting mortality at a reasonably high level of specificity is low, which points to the need for other, additional indicators of risk for mortality.

Nutritional status affects the severity and duration of illness episodes and, most importantly, case-fatality rates (*Chen* 1983). As the commonest illnesses causing death in young children in developing countries are curable, it may be plausible to assume that anthropometry can identify children early enough for treatment to prevent serious illness and death. However, none of the studies of the association between anthropometric status and mortality reported the cause of death, and it is not possible to ascertain what percentage of the deaths identified by anthropometric screening could have been prevented subsequently by a feasible intervention and what percentage of the non-identified deaths were similarly preventable (*Mosley* 1985). Thus, the first half of the condition for screening effectiveness, evidence of a relationship between anthropometric status and morbidity and mortality, is well established. The second half, the effectiveness of early intervention (targeted to children through growth monitoring), has not been conclusively proven through controlled study designs.

2.2 Vehicle for the Focussing of Health Interventions

A basic justification for screening is the availability of an effective intervention for the problem identified (*Frank* 1985). The main interventions provided in child health programmes are health and nutrition education, diagnosis and treatment of acute and chronic illness, immunization, food supplementation and Vitamin A prophylaxis. Only the first three interventions, those targeted through growth monitoring to at-risk children, are reviewed for evidence of their effect on the growth and health of children, since immunization and Vitamin A prophylaxis are likely to be given to all children irrespective of their anthropometric status.

Two important caveats to these studies of health and nutrition interventions should be noted. The research has largely been restricted to biomedical prospective studies of the effects of specific technologies on intervention and control populations, and has not accounted for the socio-economic factors which affect illness and parents' response to illness in children (*Mosley and Chen* 1984). As will be shown in Chapter 8, some of these, such as maternal education, have important effects on health outcomes. Also, most studies were of pilot or research projects with unusual levels of resources, and it may not be possible to generalize the findings to large-scale programmes (*Gwatkin et al* 1980).

2.2.1 *Food supplements*

An obvious response to protein-energy malnutrition would appear to be food supplementation. Nutritional supplements improve nutritional status and mortality, but not the incidence of infections (*Baertl et al* 1970, *Kielmann et al* 1978, *Mosley and Chen* 1984). However, an extensive review of food distribution programmes concluded that the effect of supplementary feeding on growth was "surprisingly small" and expensive for the benefit (*Beaton and Ghassemi* 1982). This appeared to be due to extensive leakage of food to non-target groups and the replacement of home food consumption by the rations with little change in total intakes; when dietary intake was verifiably improved, large effects on the rate of growth were shown (*Yarbrough et al* 1978).

2.2.2 *Curative and preventive care*

The original under-fives programme at Imesi in Nigeria provided growth monitoring, immunization, maternal education and detection and treatment of common diseases. After some years, the childhood mortality rate in Imesi was 18/000, compared to 51/000 in a nearby control village. The Imesi children were significantly taller and heavier than control children (*Cunningham* 1978). A review of ten projects by Gwatkin et al (1980) concluded that health and nutrition interventions could reduce infant and child mortality by one-third to one-half in one to five years at a low cost. The most promising components were identified as maternal food supplementation, maternal immunization for tetanus, nutrition monitoring, and reliance on paramedics.

The relative importance of nutrition and control of illness in reducing growth faltering and mortality rates is debated. The Narangwal studies did not show that the combination of medical and nutrition care substantially reduced mortality rates, compared to medical care alone (*Kielmann et al* 1978).. Studies in Guatemala interpreted the reduced mortality as a result of medical care more than the nutrition interventions (*Martorell and Ho* 1984). A few studies have compared the effect of health care, nutrition supplements and psychoeducational stimulation on cognitive ability and growth of malnourished children, indicating that the stimulation had an important effect on growth and psychomotor and mental development (*Brozek* 1982).

2.2.3 *Nutrition education*

Nutrition education has been a major component in child health programmes in the belief that, first, there is a potential for nutrition education to improve nutritional status, and second, that educational interventions can change behaviour. Although malnutrition is largely a reflection of poverty, nutrition educationists believe that households can make better use of their resources to optimize nutrition. Feeding of weanlings especially is not mainly income-determined (*Bagchi* 1985). Even very poor families can benefit from education about breastfeeding, low-cost weaning foods, early recognition of malnutrition, and prevention and treatment of diarrhoea (*Shah et al* 1976, *Odumosu* 1982, *Zeitlin et al* 1984).

If there is a theoretical potential for nutrition education to be beneficial, the evidence that it actually has been is controversial. Typically, studies of the effectiveness of nutrition education have shown improvements in mothers' knowledge but not in practices nor in nutritional status (*Hoorweg and Niemeijer* 1980a and 1980b). A combination of nutrition education and supplementary feeding in four projects reviewed by Gwatkin et al (1980) showed substantial effects on growth and mortality. Only one study was found which separated the effect of education from that of food supplements without education. In Morocco, the percentage of children aged 30-59 months who were less than 75% of the median weight-for-age declined from 34% to 16% after an education component was included in the food supplementation programme (*Ashworth and Feachem* 1985).

No studies were found in the literature which showed the contribution of growth monitoring to the effectiveness of health and nutrition education. In Thailand, one study found that monitoring by itself had little effect. The proportion of children with second- and third-degree malnutrition declined over six months in the villages given both growth monitoring and nutrition education. Much smaller declines occurred in control villages and villages with growth monitoring only (*Viravaidhya et al* 1981). Unfortunately there were no villages which received nutrition education alone, so it is not possible to ascertain whether monitoring contributed to the success of the nutrition education.

Social marketing -- the use of marketing techniques for social purposes -- has been used to help define needs and assist communities to design appropriate nutrition education programmes. In Indonesia, this approach improved nutrition knowledge and status across all levels of mothers' education (*Berg* 1987). The mass media was used to reinforce village-level teaching; the relative contribution of the mass median and individual growth monitoring in effecting change is not known. Nutrition education was cited as significantly reducing the prevalence and severity of malnutrition when delivered by intensive outreach strategies in pilot projects in Uganda, Thailand, and Jamaica (*McDowell and Hoorweg* 1975, *Gwatkin et al* 1980, *Hornik* 1985). One, the Thai programme, was reviewed again years later when the activity of administrators had subsided to a routine level, and little change in malnutrition levels was found (*Viravaidhya et al* 1981).

Some of the most successful nutrition education techniques have been summarized as: using a mixture of face-to-face extension education and mass media, using "participatory" and "problem-posing" rather than didactic methods, and employing multiple channels to disseminate the same message (*Hornik* 1985, *Pacey and Payne* 1985). These elements are not always found in routine health programmes. Studies of health and nutrition education have often shown that workers find health education less satisfying than clinical work; the inadequate time and effort they put into teaching results in correspondingly little impact (*Phillips et al* 1984, *Reid* 1984). They do not always have the correct nutrition knowledge to impart, and they rarely have skills in techniques of adult participatory education, supposedly key to translating knowledge into practice (*University of California* 1975, *Alnwick* 1985, *Griffiths* 1986).

2.3 Vehicle for Community Participation and Development

The concepts underlying primary health care relate better health not only to provision of health services but also to equity in the distribution of socio-economic resources and participation of beneficiaries in decisions about their health. Although this theory is widely accepted, there is a relatively poor understanding of the processes which lead to equity and participation and few pragmatic ideas of how to assess them (*Rifkin and Bichmann* 1988). One analysis of 35 primary health care projects found empirical evidence that participation of the community had increased coverage and service utilization, facilitated behaviour change, created more culturally appropriate services, and promoted community self-reliance and socio-economic development. The impact of community participation on health status could not be shown, but was inferred from intermediate measures of health impact, such as increased service utilization and changes in behaviour (*American Public Health Association* 1983).

The role of growth monitoring in promoting community participation has not been studied systematically, and evidence of its importance is conflicting. Some of the best-documented programmes which have been able to motivate communities to act upon the social and economic processes affecting their health tend to be run by large and exceptionally competent non-governmental organizations (NGOs) in Asia that have expanded their scope over years of experience. Some have used growth monitoring as a basic educational and motivational strategy, while others found that it did not arouse any interest in the population, or simply did not feel it to be a necessary part of their strategy (*Mukarji* 1985, *Nath et al* 1985, *Bhan and Ghosh* 1986, *Arole* 1988, *Chauduri* 1988).

2.4 Information for Nutritional Surveillance and Programme Management and Evaluation

Information is necessary for managers to detect problems, set objectives, see that decisions are implemented, and monitor progress. Information on the amount of programme services provided is relatively easy to obtain, in contrast to information on targeting and on the quality of services. Anthropometric data are used as an outcome indicator in most nutritional surveillance systems and some health programmes (*Mason et al* 1984). They reflect the impact of underlying factors which influence nutritional status and are thus useful to plan, manage and assess interventions which influence nutritional status. However, the multifactorial origin of malnutrition also means that caution is needed in interpreting nutrition status indicators as evidence of health service impact (*Payne* 1985a, *Nabarro and Chinnock* 1988). Information for management and evaluation is not a basic objective of regular growth monitoring, but a useful tangential benefit.

2.5 Growth Monitoring in Child Health Programmes

Summarizing the above, there is good evidence that food supplements and health care can significantly benefit child health. Reviews of health and nutrition education have concluded that considerable progress has been made in the last decade in developing effective educational techniques, but in most routine programmes health workers are found to be more effective at clinical work than health education (*Hornik* 1985). The relative importance of the various interventions is not clear, as few studies have assessed them separately. The importance of growth monitoring for the focussing of interventions is also unclear. Few details were given, even in the best documented studies, of precisely how growth monitoring was implemented and how data were used; monitoring was considered an integral part of the interventions and its contribution to the effectiveness of interventions was not studied separately. There is some evidence from studies of health education that growth monitoring by itself does not promote behaviour change.

Four of the projects reviewed by Gwatkin et al (1980) used growth monitoring to focus interventions on at-risk children. Another four projects which also improved morbidity and mortality rates in children did not include growth monitoring as part of their activities. This is echoed by experience in a number of NGO programmes in Asia, only some of which used growth monitoring. It would appear that growth monitoring was not a critical variable in the success of child health and community development programmes, and other strategies were equally effective in reducing morbidity and mortality.

None of the major studies reviewed had systematically collected data on the organizational determinants of performance or on the background factors which affected ability to deliver and utilize services. The relationships in these projects between implementation processes and outcomes remain obscure, but there is no doubt that such factors as adequate supplies and logistic support, careful selection of personnel, realistic job assignments, good training and supervision and dedicated leadership were important determinants of service outputs and health outcomes (*Gwatkin et al* 1980).

2.6 Effectiveness of Screening

Screening of children by growth monitoring requires accuracy in several sequential steps: reading of the weight, plotting the age and weight on the growth chart, and interpretation of the child's growth pattern. There are few published reports with details of health workers' competence in these activities, and even fewer give details of the system of training and supervision required to ensure accuracy.

2.6.1 *Weighing and charting*

The reading and plotting of weights has been described as "frequently" inaccurate by Gopalan and Chatterjee (1985), while others have found that these activities are well done (*Gopaldas* 1988, *Ghosh* 1988). A common source of error occurs when workers fail to leave a space blank for each month the child has not been weighed, giving a falsely positive impression of the child's growth. Growth charts may be simple in concept but prove difficult to use. A postal survey of 322 health personnel in over 50 countries who had used growth charts for at least four years in their programmes found significant difficulties with various processes: determining the month of birth (78% of respondents), plotting the weight (49%), understanding the use of the "at risk" section of the chart (47%), interpreting the weight curve (43%), and weighing correctly (30%) (*O'Brien* 1979). The lack of a sufficient supply of charts is a problem in many programmes which precludes accurate assessment of growth (*Gopalan and Chatterjee* 1985).

2.6.2 *Interpretation of growth*

Even if weights are accurately plotted, interpretation may be inaccurate. Marked weight gain and loss is usually recognized, but a weight gain that is inadequate, i.e. not parallel to the reference curve, may not be recognized as a danger signal. One study in India found that 35% of children with effectively no weight gain for three months or more had received no interventions (*Gopalan and Chatterjee* 1985). O'Brien's survey (1979) found that 25% of senior staff interpreted the chart wrongly, and 27% of staff emphasized the attained weight in relation to the reference curves but did not look at the weight trend.

Diagnosis also involves establishing the reasons for growth faltering, by questioning the mother and examination of the child. Nabarro and Chinnock (1988) imply that the reasons for growth faltering may be too complex for health workers to unravel; most authors pass directly from discussing the interpretation of the weight curve to counselling, without examining the methods workers use to arrive at their decisions about interventions (*Morley and Woodland* 1979, *Gopalan and Chatterjee* 1985).

2.6.3 *Coverage of programmes*

The impact of a screening programme depends on adequate coverage; this implies that children at risk of malnutrition are monitored sufficiently often for growth faltering to be detected early. Although children under three are the most vulnerable age-group, attendance may drop after the age of immunization or after about two years of age when the next baby has been born (*Gopalan and Chatterjee* 1985). Frequency of attendance varies greatly, from an average of three visits per year reported in The Gambia to 95% monthly attendance in "rare" cases in India (*Gopalan and Chatterjee* 1985, *Nabarro and Chinnock* 1988). Terminology about coverage is frequently non-specific: the denominators may refer to all children under three or under five in the population, or to all children registered in the programme. Large-scale programmes especially show a low and non-representative coverage, with higher-risk children attending less frequently. This in itself gives a misleading impression of the benefits of screening and interventions, since high-attendance mothers usually have social and economic advantages which benefit their child's growth and health independently of the effects of health programmes (*Frank* 1985).

A postulated effect of growth monitoring is that it encourages more frequent utilization of health services. Only one study was found that seemed to show this effect. In Haiti, villages with monthly growth monitoring rallies had higher rates of immunization and greater use of oral rehydration than villages with health services but no growth monitoring provided monthly in the village. Interestingly, no differences in nutritional status were found (*Rohde, cited in Ashworth and Feachem* 1986). Other authors attest to the interest of mothers in following their child's weight (*Arole* 1988), but it may be that these are a self-selected group of mothers who attend sessions frequently. It is not clear that people are more attracted to health services which include weighing than services without weighing.

2.6.4 *Prevalence of growth faltering*

Few details are given in the literature on the numbers of children in weighing session who are identified as having faltering growth. The frequency of infections, especially diarrhoea, suggests that a substantial proportion would be selected for this reason alone. For example, a study in The Gambia of 277 children six to 36 months of age living in a town with a chlorinated water supply found that the mean number of days with diarrhoea was 12 out of 105 (*Pickering* 1985). In the Tamil Nadu Integrated Nutrition Project (TNINP), it was found after one and a half years of implementation that 50% of children aged 7-36 months were selected for supplementary feeding at any one time. Eighty per cent of the children received supplementary feeding at least once, and 25% at least twice (*Gopalan and Chatterjee* 1985, *Bhan and Ghosh* 1986).

2.7 Health and Nutrition Interventions

As well as accurate and frequent screening, a further condition for programme effectiveness is the ability of mothers and health workers to take appropriate action. Growth faltering is supposed to provide a focus for health workers to offer both nutrition counselling and treatment of illness. In many programmes, counselling consists of brief standardized directives given to mothers during a hurried consultation. One description of nurses interacting with mothers showed that most consultations lasted less than two minutes, and nutrition advice was not given to all children indicated, involved little questioning of the mother, and was very generalized (*Reid* 1984). Group health education may be a short lecture on a frequently-repeated subject (*Ritchie* 1979). Workers commonly do not provide details on the amount, frequency and bulk of diet appropriate for children of different ages, and they do not include information on dealing with anorexia and the importance of extra feeding after an illness *(Alnwick* 1985). Less frequently mentioned is the failure of health workers to listen to mothers, to elicit their ideas on the reasons for poor growth and the interventions they would find possible and effective (*Rohde* 1985). The programmes with an active and imaginative health education component tend to be run by NGOs that have put unusually large efforts into this activity.

Another frequent observation is that health workers do not recognize or treat infections appropriately. However, unlike discussions of nutrition counselling, almost no details are given in the literature of specific deficiencies. The prevention and treatment of illness is also undermined by lack of systemic back-up: non- availability of vaccines and drugs, distant and expensive referral facilities, and health workers at referral centres with low levels of skills (*Gopalan and Chatterjee* 1985). The lack of back-up refers also to the integration of growth monitoring with other child health activities, particularly in organizing services so that immunizations and treatment are available at the same time and place as weighing.

These observations on the health interventions reflect the poor delivery of health services in general, and are not a criticism of growth monitoring per se. However, the interventions are central to programme effectiveness, and growth monitoring is of little benefit without them.

Growth monitoring might in fact detract from programme effectiveness by removing resources, especially the time of health workers, from other activities (*Phillips et al* 1984). Although illness is a common cause of growth faltering, there is some evidence that health workers at weighing sessions emphasize nutrition counselling and pay inadequate attention to treatment of infections. (The converse is true of activities in curative care sessions -- nutrition is ignored and treatment is emphasized). Most programmes have failed to develop a simple, operational, written strategy which integrates all possible interventions of the health service to cover the majority of situations encountered by health workers in dealing with growth faltering.

2.8 Community Participation and Development

In those programmes which have succeeded in promoting the community's participation in health and development activities, the educational aspects of growth monitoring appear to have been given greater emphasis than screening and health aspects. A critical factor in the evolution of several programmes from clinic-based growth monitoring to community-based development activities seemed to be the involvement of women's groups (and eventually other community groups) in an increasing number of the growth monitoring activities. With greater understanding of the underlying reasons for poor growth, the groups implemented wider health actions such as improved water supplies, a village child care system and home gardening (*Grant* 1987, *Chauduri* 1988).

At least three large government programmes have attempted a participatory approach to involve communities and other sectors besides health. The Indonesian programme, designed to be carried out by communities and lead to a community definition of problems and interventions, has found that communities have largely restricted themselves to screening and counselling, although "a number" of villages have developed income-generating schemes for feeding needy children (*Hill et al* 1983). The Joint Nutrition Support Programme (JNSP) of Tanzania was designed as a multisectoral approach to nutrition issues, with child care and development as the central focus, and self-reliance and community responsibility as the underlying principles. In less than two years, the programme was able to train large numbers of volunteers to weigh and chart and monitor the village nutrition status. An evaluation found that "many" villages had subsequently set up a monthly health day, when health staff were asked to immunize children while villagers weighed them. However, few villages had gone beyond weighing and charting, and child care and development had remained an isolated component of the overall programme (*Payne et al* 1986). In Thailand, growth monitoring had stimulated communities to produce food for supplementary feeding and other government departments to consider nutritional issues in their programming (*Grant* 1987).

2.9 Information for Programme Management and Evaluation

Growth monitoring can generate data which are useful to evaluate health and development programmes and to assess changes over time. In Indonesia, volunteers analyzed data at the end of weighing sessions to assess coverage and weight performance of children. Data were aggregated at health centres and higher levels to prepare regional nutrition profiles, monitor programme implementation and determine impact (*Directorate of Nutrition, Indonesia* 1985). However, it is likely that the coverage data were unreliable because census data were inaccurate, and the effectiveness data were dependent on attendance, making it impossible to distinguish between low attendance and low weight gain as the cause of poor programme performance (*Gopalan and Chatterjee* 1985).

Village committees in Tanzania analyzed data and passed reports to different administrative levels. An evaluation concluded that there was some awareness within villages that growth data reflected social inequities, but this awareness had not led to effective actions. As in Indonesia, the data had been useful in advocacy, training and education, so that nutrition was now regarded as a concern of all sectors, not only health (*Payne et al* 1986).

These relatively successful examples of data use are probably the exception rather than the rule. Frequently the population in the programme catchment area is not known accurately enough for coverage to be assessed, and organizational difficulties with reporting and analyzing service data in general preclude the effective use of growth monitoring data. The essential tension between the need for simplicity and ease of use by communities, and the specificity and sensitivity required for evaluating effectiveness and impact has proven difficult to resolve (*Hill et al* 1983). Information on the effect of data analysis at the community level on the community's motivation and participation was not found by the author in the published literature.

2.10 Information for Nutritional Surveillance

A few programmes use growth monitoring primarily for nutritional surveillance to identify individuals and groups for food rations (*Unicef* 1983, *Murthy* 1984). A review of surveillance systems by Mason et al (1984) cited the use of monthly clinic weight data in only one of eight programmes listed; the rest used data from periodic surveys. Problems of representativeness and accuracy and the difficulty of analyzing such large volumes of information are the main reasons (*Hill et al* 1983, *Unicef* 1983).

The validity, reliability and representativeness of routinely collected data have rarely been assessed. A study in Swaziland found that prevalence rates of low weight-for-age in first-time attenders at growth monitoring sessions matched well with prevalence rates from a national survey, but the proportion of underweight children among re-attenders was less than half that in the survey. Regional differences in the proportion underweight were also not detected by growth monitoring data, which casts some doubt on the validity of the data (*Serdula et al* 1987). By contrast, Trowbridge et al (1980) found that weight-for-age data from clinics in El Salvador reflected measured regional and seasonal differences in nutritional status.

2.11 Costs of Programmes

It is necessary to be very explicit about the elements included in the costing of growth monitoring. Programmes which consist of weighing and referral only will be much less expensive than those which offer more interventions, simply because they offer fewer services. If a comprehensive child health programme with immunizations, curative care, and preventive and promotive activities already exists, a growth monitoring strategy would need to add only the cost of scales, charts, training, and the staff time required for weighing, charting and supervision of these aspects.

Unicef estimated that weighing and charting activities alone cost £1.4 per child-year in India in 1983 (*Ashworth and Feachem* 1986). Gopalan and Chatterjee (1985) estimated the annual cost in India for monthly weighing of 50% of under-fives would be £21.2 million for extra staff time and £15.4 million to provide one scale per 100 under-fives (a generous provision, especially if only half of under-fives are weighed monthly). They described the cost of growth

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[1] Throughout the document, conversions have been made from U.S. dollars into pounds sterling using the yearly average of the exchange rates for the year in question, as calculated by the International Monetary Fund.

monitoring as "colossal", just for equipment, training, salaries of workers or opportunity costs of volunteers, and the high levels of supervision and management needed to prevent it from becoming a "weighing ritual" (although good supervision is necessary anyway for all the other aspects of child health services to be effective).

In Indonesia, the cost of the growth monitoring strategy in 1981 was reckoned as £3.20 per child-year, not including scales and volunteer labour, but including the drugs (Vitamin A, iron, anthelminthics, and ORT) provided at sessions (*Gopalan and Chatterjee* 1985). The Tamil Nadu Integrated Nutrition Project was costed in 1984 at £5.4 per child for weighing, screening and nutrition education, £6.9 per beneficiary receiving comprehensive nutrition and health services, and £9.2 per beneficiary if feeding was included (*Berg* 1987). In the Indonesian Nutrition Education and Behaviour Change Project (INEBC), which included weighing, charting and education by community volunteers backed up by radio education, costs were evaluated at £1.94 per child-year during the pilot project stage in 1981 and prospectively estimated at £1.00 for the large-scale programme. The cost per beneficiary was £4.85 in the pilot stage, and estimated at £2.47 for the large-scale programme. When the figures for the Tamil Nadu and INEBC projects were projected to estimate the costs of national level programmes, they formed 2.12% of India's total national budget and 0.15% of Indonesia's national budget (*Berg* 1987). No food transfers were involved, and the opportunity costs of volunteers were not evaluated. None of the evaluations included the transport and time costs to the beneficiaries of using the service.

Another cost of growth monitoring is the opportunity cost of health workers' time. This is not a problem where low utilization of health services means staff have spare capacity, but where they are already fully occupied, other health activities may suffer (*Phillips et al* 1984, *Taylor and Parker* 1987).

2.12 Conclusion

There appear to be two basic strategies for implementing growth monitoring: an educational strategy, which emphasizes enabling people to participate in their own health care, and a screening strategy, which is primarily directed at improving the quality and efficiency of the health system. Both roles, as a catalyst for action and a diagnostic and treatment tool, are found in health programmes, although the screening strategy predominates.

It is clear that anthropometric indicators do predict the children at risk of mortality, though with a low positive predictive value. Problems of infrequent screening and non-representative coverage reduce the potential impact of screening even further. There is little evidence that growth monitoring improves coverage of health care. Much growth faltering is caused by obvious infections which can be diagnosed simply by questioning the mother and examining the child. Growth faltering which is not caused by obvious infection may be detected by regular weighing, but its nature may in some cases be so complex as to not be treatable by medical care, especially by paramedical staff. In many areas, growth faltering in children under three years of age is so widespread that the cost of screening outweighs the savings from the targeting of interventions. From this viewpoint of the benefits of screening, the justification for growth monitoring is weak.

The main justification for growth monitoring is, however, as a catalyst for action on the part of the mother, health worker and community. Although definitions of community participation and development are imprecise and reflect a continuum of actions, it appears that some small, autonomous organizations have found growth monitoring to be a credible starting point for motivating communities to undertake social and economic actions to improve their health. In government programmes however, the implementation of growth monitoring has not resulted in fundamental social change, but has led to limited health action by the community. Furthermore, numerous effective health programmes have never used growth monitoring as part of their approach, indicating that it may not be a critical variable in success.

The confusion between growth monitoring as a facilitator of interventions and the interventions themselves, has led growth monitoring to be considered as an integral part of the interventions without carefully reviewing its unique and separate contribution to their effectiveness. Very few studies were found that could show that growth monitoring improved the care given by workers, increased utilization of services, promoted compliance with advice and treatment, and led to greater effectiveness of services with reduced morbidity and mortality. Evidence for the contribution of growth monitoring to the promotion of community participation and development was equally sparse and ambiguous. Similarly, the costs of growth monitoring have not been evaluated separately from programme interventions.

Programme delivery and impact depends on many factors on which growth monitoring has little effect: adequate resources, trained staff, good management, dedicated leadership, social and economic policies which promote health. Without a minimal level of these inputs, growth monitoring would be a time-consuming, costly and ineffective activity. Although there are many claims for the usefulness and importance of growth monitoring, they are neither supported nor refuted by the small amount of careful, empirical research which has been published.

CHAPTER 3

THE STUDY SETTING: BACKGROUND INFORMATION

3.1. Zaire

Zaire is the third largest country in Africa, located in the centre of the continent and straddling the equator. With over 300 ethnic groups, four "national" languages and French as the official language, it has great ethnographic variety which is matched by wide variations in climate and topography. Although there are no known oil reserves, the country is rich in other natural resources. The reserves of hardwood are the largest in Africa, and only about 10% of the land suitable for agriculture is exploited. About three-quarters of the population earn their living from agriculture, which accounted for 30% of the Gross Domestic Product and 14% of commodity exports in 1979-81 (*World Bank* 1982 and 1985). The manufacturing sector in Zaire is also dominated by agro-industrial enterprises, located in the cities where 40% of the population live.

The country is divided into nine administrative regions, and various sub-regions, zones, and smaller local divisions called collectivités, localités and sub-localités. The current President has been in power since 1965, and espouses a flexible form of Marxism, although the political structure has maintained the traditional authorities at the collectivité level and below. The institutional capacities of government departments are weak, and are marked by an inability to define and manage sector policies, co-ordinate activities, and provide essential services (*World Bank* 1982, *Young* 1985). The per capita Gross National Product in 1985 was US$ 210, as compared to US$ 223 in 1950 (*World Bank* 1987). Economic deterioration accompanied by steep inflation since 1975 has been mirrored by a decline in transport and communication systems, health, education and other government services, food supplies, and availability of consumer goods. The output of the local staple foods, (cassava, maize and rice), appears to have declined since 1972, although reliable figures are not available.

3.2 History and Current State of the Health Sector in Zaire

At independence in 1960, Zaire had a fairly comprehensive health care infrastructure of hospitals and health centres, with some vertically-organized public health programmes aimed at major diseases. The political upheavals of the 1960s led to the departure of most expatriate staff, who were the managers of the service, and the destruction of many of the training and service facilities. In 1973-74, the process of Zairianization and nationalization destroyed the distribution network of the health system. Lack of a national health policy led to misallocations of health budgets and maldistribution of health personnel and facilities. Between 1972 and 1980, the number of health facilities increased by an average of only one per cent per year. Although capital investment increased in the 1980s, many of the facilities are not functioning effectively because of severe shortages of drugs, supplies, vehicles and personnel, many of whom have entered private practice. The private sector, including NGOs, missions and industry, plays a major role in the health sector, operating over 50% of hospital beds (*World Bank* 1982). A nutrition research and planning institute was established in 1978, whose priority interests are in children under five and pregnant and lactating women. Its research activities have been confined mainly to Kinshasa and surrounding areas.

In 1982, an ambitious national health plan was published which established primary health care as the national priority. It was intended that 140 health zones would be established by 1986, each with a basic infrastructure of health centres and a referral hospital. All the health services in the zone were to be integrated into one system, and the participation of the community, defined as payment for care and management of services by health committees, was to be sought. By 1984, 90 health zones had been established, although adequate staffing remained a problem in many of them. At this time, the central government was contributing 10 Zaires (£0.19) per capita to the health sector overall, compared to the estimated Z70 (£1.3) which was required to finance a health zone (*World Bank* 1985).

The health and demographic statistics for Zaire are similar to most other developing countries (Table 3.1). Its infant mortality rate is in the middle of rates for African countries.

Table 3.1
BASIC HEALTH AND DEMOGRAPHIC INDICATORS, ZAIRE

Population	1985	30.6 million
Crude birth rate	1985	45
Crude death rate	1985	15
Infant mortality rate	1985	102
Child death rate (aged 1-4)	1985	20
Life expectancy at birth	1985	51
Total fertility rate	1985	6.1
Population growth rate	1980-85	3%
Calorie intake as % of requirements	1982	98%
Per capita protein intake (grams/day)	1982	33
Population per physician	1980	13,940
Adult literacy rate	1980-82	54.5
GNP per capita	1985	US$ 210
GNP annual rate of growth	1965-85	-2.1%
Expenditure in health sector as % of total central government expenditure	1985	1.8%

Note:
Zairian statistics are not always accurate.

Sources:
World Development Report 1987. Oxford University Press for the World Bank.

Zaire Economic Memorandum 1982. Recent Economic and Sectoral Developments and Current Issues. Report No. 4077-ZR, Vol II: Sectoral Developments and Issues. World Bank 1982.

3.3 Boga

3.3.1 Geography and economy

The Boga health zone is an upland savannah area located in the region of Haut Zaire, Ituri sub-region, bordering on Uganda. The main "town" of Boga has only slightly over 1000 inhabitants and is 120 kilometres by unpaved road from Bunia, the nearest large town. The zone is relatively small, with about 20,000 people living in an area of 2400 square kilometres. The population density varies from about 10 people per square kilometre in cattle-raising areas to 26 per square kilometre in agricultural areas (*Ruhigwa* 1982). More than half of the population live in villages of 500 people or less. The soil is fertile and two main harvests a year are cropped, although intercropping allows smaller harvests in between the main ones. Cassava, bananas, and sweet potatoes are the staple foods, and are usually available year-round, though the main source of protein, beans and peanuts, are in short supply between January and March. Small amounts of coffee are grown for cash. Meat consumption is estimated at only 0.2 kilograms per capita per year, mostly from small animals (*World Bank* 1983). A study conducted in the area in 1980 estimated that mean gross family incomes in rural areas were £257.5 for crop farmers and £1717 for a family with 260 head of cattle, of which cash revenues formed 20-30%. The estimated relative poverty income level in rural areas was £28 per capita in 1983 (*World Bank* 1983).

The two main tribes in the area are the Wangiti, who are mainly agriculturalists, and the Wahema, who are agro-pastoralists. The Wahema came from Ethiopia two or three thousand years ago and subjugated the indigenous Wangiti, who became a sort of inferior caste, renting agricultural land from the Wahema and working for them as cattle herders. Although frank economic exploitation no longer exists, cultural separation continues, inter-marrying is rare, and the Wahema remain economically better-off than the Wangiti (Atwoki 1978). There are also small numbers of individuals from other tribes in the zone, mainly refugees from Uganda and immigrants from other areas of Zaire.

Agricultural or grazing land is available from the local chief at a low or no rent. The average nuclear family works a farm of 2.5 hectares, although if more labour is available, the farm size will be larger. Farmers are skilled but production methods are primitive, with almost no inputs but manual labour. There is a clear division of labour between the sexes, with women having by far the heavier workload. Men are responsible for clearing and preparing the land for planting; women for sowing, weeding, hoeing, harvesting, and the transporting and selling of produce (*Thibault-Normand* 1986). Women are required to give all the produce or earnings from it to their husband, who distributes it within the family and to his elders. Women work in the fields from shortly after dawn to early afternoon, when they return home to start their domestic tasks and the preparation of the evening meal. Cooking is done on the ground over a three-stone wood fire. Water sources are mostly unprotected but are usually less than 400 metres from homes. Fuelwood is rising in price and is sometimes difficult to find in the grassy cattle-raising areas of the zone.

About 25% of the population own cattle, although herd sizes are generally small (less than 60 head in 85% of cattle-owning families) and most of those who raise livestock also have farms. The net increase in herds is only about two per cent per year because of low calving rates and high mortality among calves (*World Bank* 1983). Men are responsible for the care of the cattle, including milking; women for storing and churning milk, selling the butter and cleaning the kraal, which is contiguous to the house. Milk, butter and blood form an important part of the diet of these families, though meat is eaten on ceremonial occasions (*Bureau du projet Ituri* 1980). Those who derive most of their income from livestock have a higher average income than agriculturalists. Cattle are important for the social prestige they confer, as well as being a source of income (*Bureau du projet Ituri* 1979). Most people in the zone raise a few goats and chickens, which are kept in the house or in a kraal directly beside the house.

3.3.2 *The health service*

Health services in the zone are provided by the government of Zaire and an Anglican mission. The mission has carried out a small rural development programme since the late 1970s, which has focussed on water protection, road improvement and agricultural development. It began providing health care in 1980 with the establishment of an unofficial nurse-training school and a child health programme. In 1985, a physician arrived to become the Medical Director of the health zone and of the 50-bed hospital. A total of about 60 students are trained in either midwifery or general nursing in a two-year course, open to students with 10 years of school education. The school was recognized by the government in 1986 and the first graduates from the nurse training course qualified in 1987. The hospital is the referral facility for six health centres, each of which has a population catchment of about 4000. Health centres have six general and six maternity beds, and are staffed by a graduate nurse, a midwife, and two or three auxiliary nurses. Patients pay for treatment and medicines at each visit. Although charges are low even by Zairian standards (a consultation and treatment for malaria would cost Z40 or £0.53, for example), the salaries of the staff at the health centres are mostly covered by income received from the fees, with any deficit made up by the mission. Exact figures on financing and total costs of the health programme were not available.

Health care at the community level is provided to about half the population by 19 village health workers (VHWs), each of whom is responsible for about 100 families in his or her village. They were trained initially for two to four weeks by their supervisors (see below). Their duties include helping at the child health sessions, following up on non-attenders and malnourished children, treating a few common illnesses, and referral of ill people, improving environmental hygiene (especially by encouraging the construction of latrines), and helping to carry out an annual census. They were paid an honorarium of Z200 (£2.67 in January 1987)[1] per month.

Two supervisors are responsible for the training and supervision of the VHWs and for the conduct of the child health programme. The supervisors have had a two-year

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1 Conversion between zaires and pounds sterling in the the document will be based on the January 1987 exchange rate of Z75=£1. The zaire was devalued by 100% in four stages in 1986, and fees charged by the health services changed during the year. As far as possible, financial information is based on practices in operation in January 1987.

nurse-training programme, though not to the government-recognized level, followed by a six-month course in the training and management of VHWs. They hold a meeting with all of their VHWs once a month during which their activities and problems are discussed and informal teaching is carried out. These meetings had been attended by the Medical Director for the previous six months, but the child health sessions had not been directly supervised. The supervisors also visit the VHWs in their villages about once every three months. The VHWs are members of the village Local Development Committees which are encouraged by the health service to help construct health centres, choose the VHWs and assist them with their work. There were four active committees in 1987, which met regularly to consider water protection schemes, raise money for community purposes and monitor and help with the work of the VHW. The VHWs have little contact with the nurses in the health centres.

Health statistics for the zone were neither comprehensive nor reliable, as the health centre staff were in the process of learning how to keep statistics and prepare monthly reports. The Annual Report of 1985 for the zone reported 572 births in the health centres and hospital, of which 8.9% weighed less than 2500 grams. The 572 births represented 62% of estimated births in the zone, based on the population of 20,000 and an estimated national crude birth rate of 46 per 1000 (*World Bank* 1987).

3.4 Kasongo

3.4.1 *Geography and economy*

Kasongo is an administrative district within the Maniema sub-region of the Kivu region of Zaire. The health zone has an area of 14,750 square kilometres, much the largest of the three programme areas studied, and lies on the borders of the equatorial forest and the savannah. The 1980 national census recorded a population of 195,000, of whom 30,000 lived in the town of Kasongo and the rest in about ten villages of between 2000 and 5000 inhabitants or in smaller communities. The town of Kasongo is about eight hours by unpaved road from Kindu, the nearest large town with all-weather transportation links to larger centres.

The economy is partially self-supporting in food, growing bananas, manioc, beans and groundnuts. Rice and cotton have been grown for export on a large scale since the 1970s. There are a number of tribes in the district, although more than 50% of the inhabitants of Kasongo town are Muslim, without strong tribal affiliations (*Kasongo Project Team* 1982a). Less than a quarter of the male population has a paid job. All possess fields, whether they have a job or not, which may be up to 10 kilometres away from the town or large villages. Over 90% of women work in agriculture, about half of them spending six hours or more each day in the fields. They leave early in the morning after preparing breakfast, leaving the youngest children to be cared for by older sisters or a grandmother. Late in the afternoon, the women return from the fields to cook the second meal of the day, often for more than 10 people. The produce from the fields is the main source of food for the household; surplus produce is sold locally mainly to purchase consumer goods (*Van Lerberghe* 1987).

3.4.2 *The health service*

The health services of the district are provided by the government of Zaire and the Prince Leopold Tropical Medicine Institute of Antwerp, which has carried out clinical activities in the area since 1958. The facilities include a 180-bed hospital with a nurse-training school and 19 health centres each of which provides primary curative and preventive care to a population of about 10,000. The health centres are staffed by nurses who have had four years of training after ten years at school, and by two auxiliary health workers and a clerk trained on-the-job. There are five doctors and 45 nurses in the area, giving a ratio of one doctor per 39,000 population and one nurse per 4,300 population.

In 1971 a new project was designed to carry out research into the means of organizing rural health services on a self-sufficient and comprehensive basis. The project has three major features: participation of the community, development of health personnel, and financing of the system. The participation of the population was sought in order to supplement the resources available to the health service, and to provide a counterweight of the population's value judgments to the technical judgments of the medical service. The mechanism chosen for this participation was the establishment of health committees which are made up of representatives of the local population, chosen by the chief and other members of the committee. The committees meet monthly with health centre staff, to discuss local health issues and to administer the health centre, mainly by managing its finances and the employment of auxiliary staff. The interest and capability of the committees has varied widely, generally being better where the village already had other functioning organizations (*Kasongo Project Team* 1982a). Participation is also measured by the willingness of the population to register with the health centres, registration implying that the health centre undertakes to provide the health care for that person for a set fee per episode of illness. Eighty-two per cent of households living in the centres' catchment areas were registered with them in 1987 (*de Brouwere* 1988).

Development of the capacity of all levels of health personnel is a second important facet in the project design. This is achieved through systematic supervision and the delegation of medical and nursing tasks to nurses by means of algorithms which describe the diagnosis and treatment process for curative consultations and the process for preventive consultations with children under five and pregnant mothers. The use of the algorithms has helped to improve and standardize care, rationalize the use of drugs and supplies, achieve more rapid diagnosis of serious illness and decrease the number of patients referred to the hospital (*Van Lerberghe and Pangu* 1988). In the monthly supervisory visits, the physician responsible for the health centre systematically observes the work of all the staff and discusses the findings with them at the end of the visit. This system has enhanced the nurses' confidence and their status in the eyes of the communities (*Equipe du projet Kasongo* 1976). As far as could be determined by the author from the comments and behaviour of staff, the visits are looked forward to as an opportunity for professional learning and collegiality with the supervising physician.

The system has aimed to enhance continuity of care through the use of the algorithms, and a system of payment for care by episode of illness, rather than by visit. A patient coming to the health centre pays a fixed sum (Z45-75, or £0.60-1.00, varying with the health centre) on the first visit which covers all services, including hospitalization, which are necessary to treat the illness. These payments have enabled the health centres to be self-supporting except for the nurse's salary, although drug costs are subsidized by tax-free procurement in Belgium by the project. With the progressive devaluation of Zairian currency, the contribution of the population has increased in real terms from £0.13 in 1982 to £0.29 by 1986, and the contribution of the central government has declined from £0.29 to £0.06 per capita over the same period (*Pangu and Van Lerberghe* 1987). The overall cost of the health service in 1984 was £2.01 per capita per year including supervision from Antwerp, local supervision and depreciation (*Kasongo Project Team* 1984, *de Brouwere* 1988).

3.5 Katana

3.5.1 *Geography and economy*

Katana is a rural area situated in the South Kivu sub-region of the Kivu region of Zaire. It is situated along Lake Kivu, about 50 kilometres from Bukavu, which is a major industrialized city. The main roads are paved and the road network and the number of vehicles are much denser than in Boga or Kasongo. With a total estimated population of 210,000 in the health zone of 1200 square kilometres, there are between 100 and 200 people per square kilometre, making it the most densely populated rural area of Zaire. The mountainous terrain is covered by volcanic soil which is fertile but progressively being impoverished by erosion. About 50% of the land is devoted to field crops and the other 50% is divided between industrial plantations (coffee, tea, quinquina) and commercial crops, mainly bananas used for making local beer. A sizeable proportion of the population have farms which are too small to provide an adequate food supply for a family without alternative sources of income; no land can be spared to be fallow. There is considerable smuggling of food into Rwanda across Lake Kivu. Industrial wages are among the lowest in Zaire (*de Feyter* 1986).

The activities of the health service are complemented by the presence in the area of a wide variety of other development organizations, particularly the Anti-malnutrition Committee which has met monthly for the past twenty years. Consisting of representatives from organizations involved in health, water supply, agricultural and livestock improvement, pisciculture, prevention of soil erosion, and food processing, it acts as an information and collaborative network for agencies in the area.

3.5.2 *The health service*

The health service was established in 1926 by the University of Louvain and the government of Belgium. Since independence in 1960, the project continues with funding from the Belgian government and managerial assistance from Louvain University. There is a 500-bed hospital which acts as a regional referral hospital. It is staffed by five doctors, three of whom are specialists. The training school has a total of sixty student nurses in a four-year programme and 15 midwives in a two-year programme. Three "referral" health centres have 40 in-patient beds and a large maternity centre, while another 16 health centres are smaller, with three or four beds. The health centres are generally staffed by a graduate nurse, a midwife, a laboratory technician, and a clerk and one or two MCH auxiliaries who have been trained at the health centre. Each health centre serves a population of 5000-10,000 (*Kaba* 1987). As in Kasongo, the health centres are self-financing except for the costs of supervision and the nurse's salary.

It is estimated that between 63-74% of children under one year of age were registered in the child health programme (*de Feyter* 1986). Registration in the programme is encouraged by a policy of reduced fees (by about half)for consultations at health centres for children who are registered, and lower charges for hospitalization. Patients registered at health centres pay a fee for every visit (about Z25 or £0.33 per consultation) and separately for the cost of hospitalization. Fees are somewhat subsidized by the higher fees charged to industries for care of their employees.

Personnel development is encouraged by several means. Supervision is carried out about once a month by the physician reponsible for the health centre, although generally for a few hours rather than the day-long visits made in Kasongo. There is also a nurse-supervisor, who has had on-the-job training in supervision and is responsible for monitoring the nursing aspects of health centre work, including the child health programme. The focus of supervisory visits is discussed and decided upon at the monthly meetings of all the health centre nurses together with the doctors. At these meetings, information is passed on and issues discussed, ranging from how to complete new accounting forms, policies for referral and transport of women in labour, to technical problems with refrigerators. As in Kasongo, the nurses in charge of the health centre are responsible for the training and supervision of the auxiliary workers. The health centres are also supported by health committees made up of local people chosen by the chief and other members of the committee. These committees take on different responsibilities, varying with their capacity and interest.

3.6 <u>The Health of Mothers and Children in the Programme Areas</u>

The small amount of information found on maternal and child health research which has been carried out in other areas in Zaire was reviewed in Chapter 2. Much of it has been done in or near Kinshasa, and it is debatable how applicable the findings are to the three health zones under discussion, due to the economic and cultural diversity of the country. Only studies which have been carried out in the Kasongo and Katana areas are reviewed here. No previous studies were found for the Boga programme area.

3.6.1 *Nutrition and health in Kasongo*

Sixteen per cent of 2371 infants born in Kasongo town between 1971 and 1975 weighed 2500 grams or less. Many of these births were to rural women, who came to town to stay with relatives while awaiting delivery (*Kasongo Project Team* 1986).

The morbidity, mortality and nutritional status of 7000 children under five years of age in Kasongo town were studied in a series of surveys between 1974 and 1978. The mean weight-for age was found to be lower than the NCHS-CDC reference values from the age of six months, a deficit which reached a maximum during the second year of life, after which it stabilized at this lower level. A deficit in height-for-age was noticeable at the age of one month, and increased up to the age of 30 months, when it stabilized

(*Kasongo Project Team* 1982b). By five years of age, the population's average SD scores were -1.6 for height-for-age and -1.2 for weight-for-age. In contrast, mean weight-for-height almost equalled the reference values (*Van Lerberghe* 1987).

This confirmed observations that acute malnutrition was infrequently seen by the health service, being limited to acutely ill or socially handicapped children, for example, children whose parents did not farm or were alcoholic. Stunting on the other hand was almost universal. Reasons advanced for these findings were that the monetary economy in Kasongo was marginal, and that there was a fairly uniform food economy for the population. Shortage of land and absolute availability of food was not a problem. This explanation gained support from the fact that height and weight gain did not show seasonal variation. Children had adapted to sub-optimal health and nutrition conditions by retarded gains in stature (*Van Lerberghe* 1987).

The period of greatest nutritional stress was six to 24 months of age, from the combined effects of weaning and infection, after which the child became more independent of the mother, and could increase its food intake by helping itself to food in the house and accompanying other children in foraging for fruit and other foods in the environment (*Van Lerberghe* 1987).

The studies also investigated morbidity and mortality in children six to 60 months of age. The risk of dying within the subsequent month was highest at the age of 10 months, when the rate reached .0060. The child mortality risk (1-4 years) was .067 for boys and .059 for girls; the second year of life accounted for 53.6% of all deaths between one and four years of age (*Van Lerberghe* 1987). Between 1974 and 1978, there were two epidemics of measles in the town, and deaths associated with rashes made up about half of the deaths in the children studied, followed in frequency by respiratory and diarrhoeal disease. Ninety per cent of rashes were due to measles according to mothers (99.4% of mother's diagnoses of measles and 85% of mothers' diagnoses of a non-measles rash were confirmed by health centres). The risk of dying after an episode of rash was highest in six to eleven month-olds, where it reached six per cent within two weeks of onset and 9.8% within thirty days of onset.

Acute lower respiratory diseases without rashes peaked at the age of three to six months, with an incidence of 22.5-33.4 episodes per 100 child-years for children less than six months old. The risk of dying within two months after an acute respiratory illness without rash was 1.0-2.6% in children aged 0-11 months, after which it declined. Large decreases in weight were measured after a child had suffered from rash and from respiratory illness without rash. If these occurred before the child was 12 months of age, the deficit in weight-for-age and height-for-age was not usually recuperated (*Van Lerberghe* 1987). The wasting caused by the post-illness decrease in weight was usually temporary and therefore not as frequently reported as stunting, since cross-sectional studies tend to show a higher prevalence of conditions with a long duration than short-lived conditions. Detailed information on diarrhoea and malaria was not collected in these studies.

Qualitative information on breast-feeding and child care was also reported. Breast-feeding was universal in Kasongo, but the frequency of feeding was decreased after the first few months of life as the mother returned to agricultural work. At about three months of age, solid food was introduced, typically cassava, rice or maize porridge. Other solid food was given at around six months, but no special food was prepared for the baby in more than two-thirds of cases.

When children were acutely ill, mothers stayed at home with them, but usually returned to field work when they seemed to be convalescing, making it impossible to assure the extra feeding required for catch-up growth after an illness. Thus child nutrition was marginally adequate as long as the child was not ill. The study considered that improving nutritional status overall would require community-level action aimed at improving the living conditions of all children, not individual counselling for the mother. However, the wasting and high fatality rates associated with infections seemed to be related to inadequate care and nutrition during and immediately after illness; this would require individual targeting of specific interventions to overcome the stressful episodes and minimize permanent damage (*Van Lerberghe* 1987).

3.6.2 *Nutrition in Katana*

Malnutrition is becoming increasingly extensive and serious in the area around the lakes where Katana is situated (*Ceplanut* 1986). In contrast to Kasongo, lack of food availability is a major problem, because of the high density of population, lack of arable land for food crops, soil erosion, low industrial wages, and lack of animal and fish protein sources (*Vis et al* 1975, *Carael* 1979). Since the introduction of cassava and sweet potatoes in 1926, seasonal calorie fluctuations have diminished but vegetable sources of protein are in short supply for about three months before the main harvest (*Vis et al* 1969).

The average birthweight in Katana hospital was 2800 gm in 1986 (*Malengreau* 1987). The number of children with birth weights of 2500 gm or less was 10% in 1979 and 17% in 1984 (*Myaux* 1985). Longitudinal studies of mothers and children conducted in four maternal-child health centres suggested that low birth weights were due to malnutrition in women, demonstrated by delayed menarche (occurring at 15-16 years in 50% of girls) and prolonged post-partum amenorrhea, where only 19% of 500 women were menstruating at one year after giving birth (*Vis et al* 1975, *Hennart and Vis* 1980). Maximum weight gain during pregnancy was four to five kilograms, and during the months of protein shortage there was no weight gain. Milk production for 167 mothers studied was about 600 ml per day, the lower limit of the range reported for Swedish mothers, and varied by about 100-

200 gm per day between the harvest period and the period of protein deficiency (*Vis et al* 1975, *Hennart et al* 1983). Children were breastfed for a long time: 99% of 200 infants were still breastfed at 12 months, and 60% at 24 months. Solid food was introduced shortly after birth, 17% of children receiving it in the first month (*Vis et al* 1975, *Hennart et al* 1983). A study on the prevalence of malnutrition in 1020 children under three years of age found that 20.4% were below the fifth percentile (NCHS-CDC references) for weight-for-height (*Vis et al* 1975).

In one area near Bukavu, infant mortality was found to be 250-280 per thousand live births, which was 2.5 to 2.8 times as high as in the same tribe in a nearby area. The study thought this was due to high rates (figures not reported) of gastroenteritis and respiratory infections, resulting from the particular pattern of child care and feeding. Mothers in the group with higher mortality breastfed even very young children only in the morning and evening, leaving them with another family member to be fed a porridge of cassava, bananas or sorghum while they were doing field work. In the other area of lower mortality, children were brought to the fields and breastfed frequently, up to 15 times a day in the first year of life (*Vis et al* 1975, *Hennart and Vis* 1980).

3.7 *Conclusion*

The impression given by these studies of mothers overburdened by heavy physical labour and domestic responsibilities and frequent child-bearing would also appear to be true for the Boga area. The pattern of frequent infection in young children and the difficulty of assuring weanling children adequate diets probably leads to much the same pattern of growth and morbidity and mortality in Boga as shown in the other two areas. In Boga and Kasongo, the absolute availability of food was not a problem, and it was possible to produce enough food to feed the family with normal labour inputs. The situation in Katana was different in that food availability was a major problem, and the level of sophistication in the area (in terms of industrialization, infrastructure, educational institutions and long-standing and numerous development organizations) was considerably greater than in the other two areas.

However, with the deterioration of the national economy, and the need to sell agricultural produce for money to buy consumer items and pay for school fees and health care, people may be impelled to define as "surplus" food which several years ago they would have kept to eat, especially beans and peanuts which fetch higher prices than staples. This is borne out by studies which show increasing levels of malnutrition in various areas of Zaire (*Ceplanut* 1986). The ability of the health service to deal with these problems is constrained by severe shortages of resources, although the non-governmental sector is better supplied than the government services. Two of the programmes studied, Kasongo and Katana, have a sophisticated level of management and research capability. All three programmes have established, with varying degrees of success, a primary health care system which provides comprehensive care to young children and seeks community inputs to the health services.

Chapter 4

METHODOLOGY

4.1 Introduction

Three child health programmes which include growth monitoring were studied in the Haut Zaire and Kivu regions of Zaire. They all used a clinic-based approach to growth monitoring. The monthly sessions (termed "child health sessions" or "growth monitoring sessions") to which mothers brought their children were observed and the health workers involved were interviewed. Information on programme costs, the supervision system, and the health records system was obtained. A community-based interview of the knowledge and practices of mothers of children under five was conducted in Boga health zone, and children's anthropometric status measured.

4.2 Observation of Child Health Sessions

The objective of these observations was to assess the quality of the interaction between the health worker and mother and child, and, more specifically, to assess the ability of health workers to:

- *weigh children and record the weight accurately*
- *obtain and interpret diagnostic information*
- *carry out appropriate interventions on the basis of this information.*

The various activities in growth monitoring (weighing, counselling, and group health education) were timed and their main characteristics observed.

4.2.1 *Weighing*

The research assistant and author observed the weighing of a total of 426 children by the health staff to determine if the weight was read and recorded accurately, whether the mother was informed of the weight, and if the child was calm or not. The time taken for these procedures was recorded.

4.2 *Consultation*

The consultations were observed to see what diagnostic information the health workers elicited from reading the growth chart, questioning the mother and examining the child. A total of 520 consultations by 31 workers were observed in 21 sessions, as shown in Table 4.1. Details of the types of workers observed are given in Table A2.

Table 4.1
OBSERVATIONS OF CONSULTATIONS AT CHILD HEALTH SESSIONS IN BOGA, KASONGO AND KATANA

	Boga	*Kasongo*	*Katana*	*Total*
No. of sessions	7	5	9	21
No. of consultations	134	118	268	520
No. of workers	8	5	18	31

The sheet in Appendix B was used to record the observations on the consultations. It was developed on a basis of generally accepted "good practice". The literature on growth monitoring recommends that a diagnosis of the child's health status be made on the basis of the weight velocity plus findings from various questions and physical examination (*Morley and Woodland* 1979, *Gopalan and Chatterjee* 1985). This information should help the health worker to understand the current physical and social situation of the child and to devise appropriate advice and interventions. The textbooks used in nurse training programmes in Zaire follow these recommendations, and were studied in order to understand what the nurses had been taught to do in child health sessions (*Fountain and Courtejoie* 1982). The observation sheet was designed by the author on the basis of the recommendations in the literature, discussed with the programme managers, and pilot tested at two child health sessions in each of the programmes. In Katana, two questions were added, as it was the practice of the workers to ask specifically about fever and diarrhoea, instead of a general question about illness.

The child's age and weight status were recorded by the research assistant, and the health worker's questions and advice were noted on a "done" or "not done" basis. The interventions of the health workers tended to be fairly standard, thus the items listed on the observation sheet covered most of the comments made by the health workers during the consultations. The time taken for a consultation was also noted.

4.2.3 *Organization of the sessions*

General note was taken by the author of the way in which the activities and health staff were organized in sessions, the sequence of activities, the movement of mothers and children through the session, and the roles of various staff. These observations were used to assess whether the organization of activities allowed for appropriate use of staff, was efficient in minimizing waiting times for mothers and children, and effective in selecting and caring for at-risk children.

4.3 Interviews with Health Workers

A variety of health personnel and lay people were interviewed by the author using a check-list of issues and topics to determine their knowledge of nutrition, illness and growth monitoring, their understanding of the importance and organization of child health programmes, their ideas about what advice or interventions were the most helpful and effective in dealing with children who were not growing well, and the support from the community for child health sessions. Because the personnel most directly involved in growth monitoring activities were nurses or auxiliary workers including village health workers (VHWs), they were the main groups interviewed. In the Boga programme, eleven VHWs and their two supervisors who were in charge of the child health sessions were interviewed; in Kasongo four health centre nurses; and in

Katana the nurse supervisor of the health centres, four health centre nurses and two auxiliaries were interviewed. It was also possible to meet with four village development committees and to talk with the three physicians in charge of the programmes about their views of the importance of growth monitoring and child health programmes, and how these activities should be organized and supervised.

4.4. Other Observations

Whenever possible, the author also took advantage of events occurring during the stay in the area. In this way it was possible to interview such diverse groups as a village nutrition study group, a group of "wise mothers" who met regularly with the health centre nurse to discuss health issues, and expatriates who had been working in the area for many years. Meetings of health centre nurses and VHWs were observed and the minutes of previous meetings were studied to get an idea of the system of supervision and teaching of these personnel. Two sessions of the nutrition rehabilitation programme were observed in Kasongo and Katana, and the doctors and nurses involved in this programme were interviewed.

4.5 Limitations of the Methods Used in Clinic Observations

A major limitation was that there was a different observer recording the weighings and consultations for each of the three programmes. Even though the author stayed with the research assistants throughout the sessions, some observer bias was inevitable. The author did not speak Swahili so fluently as to be able to ensure that every detail was noted accurately and uniformly, and occasionally the consultations were carried out in a local language. The observations made at the child health sessions were probably most accurate in Katana, where the nurse who supervised the health centres acted as a research assistant. He was familiar with the activities, and very motivated to learn how to make systematic observations and to analyze results, as he wished to improve the quality of work at the child health sessions. In the other two programmes, the research assistants were not professional nurses, and were not familiar with the child health clinics. Their attention wandered occasionally, and the author sometimes had to remind them to record an observation they had missed. For these two programmes, it is likely that the questions, remarks and advice of nurses are slightly under-reported, in spite of the author's presence during all the consultations.

The effect of the researchers' presence on the behaviour of the staff cannot be known, but probably had some effect. The health workers knew the study was being done in order to understand the way they carried out the child health sessions, and to determine the strengths and weaknesses in the programmes. At least while the researchers were watching them, they probably made an effort to do their work as ably as they could. However, the researchers' presence may have made them anxious, so that they were not able to perform as well as they normally did. The researchers tried to be unobtrusive by standing quietly behind the health workers doing the consultations. Most of the health workers did not appear to pay much attention to the researchers after the first few minutes.

In one of the sessions in Boga, the group health education was prepared especially for the visit of the researchers. The worker demonstrated how to make an enriched weaning porridge, which he freely admitted he had not done previously since his training. In the other programmes which used a mixture of discussions, lectures, songs and slogans for health education, the author was told these were usual and not arranged specially for the researchers' visit. The women sang the songs and slogans without hesitation, so it can be presumed they were used to doing this.

It was not always possible to follow a session through from beginning to end due to difficulties with transportation and communication, making it impossible in some cases to determine how long women had been waiting. Also this meant that workers were not always observed carrying out all the activities of a session, so that some details of the organization of activities were missed. The post-session interviews with the workers could not be done at every visit, thus discussion and feedback about the observations were not obtained on these occasions.

4.6 Review of Programme Aspects

4.6.1 *Supervision*

Whenever possible, supervisors were observed carrying out their usual tasks. In Boga, this involved watching the two supervisors carrying out child health clinics where they were in charge but also did a major share of the work. The monthly meetings they held with the VHWs were observed on a total of four occasions. The Medical Director of the zone was observed during her visits to health centres when she saw patients or met with staff; she did not specifically supervise child health sessions as part of her routine.

In Kasongo, the system of supervision by the doctors has been developed in great detail, both in terms of processes and objectives. One physician was observed twice on his visits to health centres where he watched the day's activities (which did not include growth monitoring) and held a feedback and discussion session with the personnel. Another physician was observed supervising a mobile child health clinic.

In Katana, the nurse in charge of supervising the health centres worked with the author as a research assistant and therefore little of his normal supervisory activity was observed. However various issues were discussed with him and the former nurse supervisor, the records of their visits kept by them were reviewed, and the Medical Director of the zone also described the system of supervision by the doctors. In this area, the senior staff felt that the nurse supervisors were more capable and more interested in supervising child health sessions than the doctors, who reserved their visits for the many other aspects of the service that needed review.

4.6.2 *Resources used and costs*

In each programme, information was obtained on the numbers of personnel used in growth monitoring sessions, their schedules of work and the time they spent on these activities, as well as the costs of transport for supportive activities, including supervision. Costs of equipment and supplies for weighing children were calculated. Immunizations were also given at the growth monitoring sessions, but the time taken for immunizations as opposed to weighing and health education was not recorded separately, so it was not possible to cost this activity separately. The numbers of children seen in 1986 were obtained from routine records in order to determine the costs per child-visit and per child under three in the catchment area.

4.6.3 *Health records*

The health records used for children registered in the child health programme were examined in each programme. They were kept by the mothers in the Boga programme and at the health centres in the other two programmes. The annual reports of the three programmes were also reviewed. In Katana and Kasongo, the referral hospital had a central office which compiled information from the health centres and this information was used to determine the level of activity in the programme, e.g. the numbers of children visiting the health centres for curative care and the number of growth monitoring sessions held. The purpose of reviewing the records was to see how the communication system between growth monitoring sessions and health centres and hospitals worked, and what use was made of monitoring information in, for example, treating sick children, or evaluating the various aspects of programmes or the nutritional status of communities.

4.7 Survey of Mothers of Under-Fives

This survey was carried out only in the Boga programme area, and used the questionnaire in Appendix C. The aim of the survey was to provide a quantitative evaluation of some effects of the growth monitoring activities, and specifically :

- *to determine whether attendance at child health sessions improved children's anthropometric status and mothers' knowledge and practices in three subject areas taught at child health sessions, namely, understanding of the growth chart, feeding of young children, and the causes and treatment of diarrhoea.*

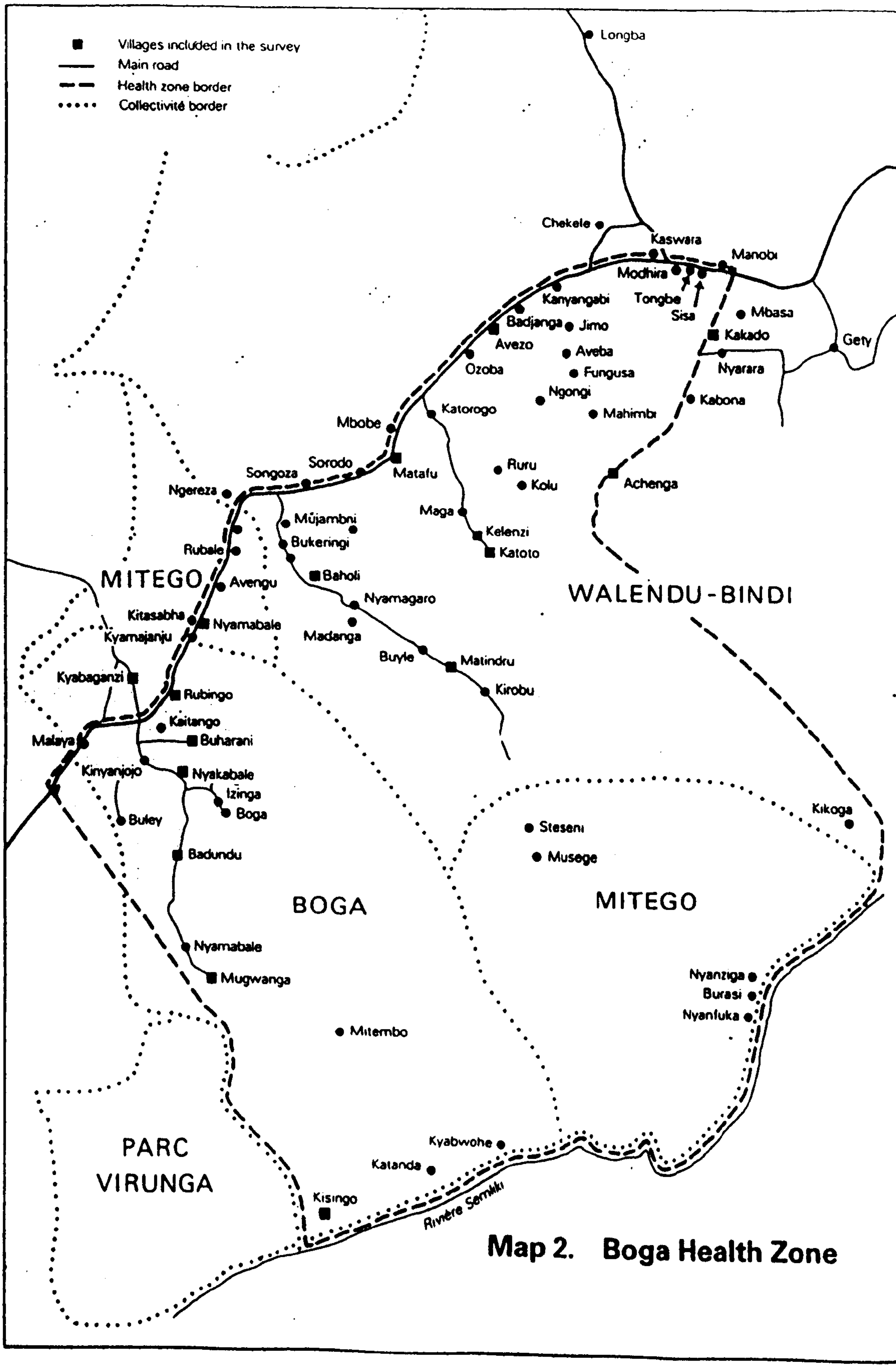
4.7.1 *Sample size and selection*

The aim of the survey was to interview 500 mothers of children under five years of age. A sample of this size would allow detection of a difference of 15% between frequently attending and infrequently attending women in the proportion who could answer correctly more than half of the questions on knowledge and practices with a power of 90% at a significance level of 5%.

In practice, 547 mothers were selected for interview, which represents 17% of the estimated 3265 households in the Boga programme area. One mother per household (defined as a group of persons sharing a common house or compound and eating from the same kitchen) was chosen for interview. In the great majority of cases (more than 90%), only one mother was found at home for the interview. When more than one mother was present, the one with a child closest to two years of age was interviewed. The child closest to two years of age was called the "index child". The questions in the interview referred to this child and the information from this child's growth chart was recorded.

Map 2 shows all the villages in Boga health zone, including the seventeen villages selected for the survey.

Two-stage stratified sampling was used to select the sample. First, the villages (*localités*) were listed by size, using the census carried out 10 months previously by student nurses, which was considered to be fairly complete in all but seven of the 54 villages. The students' census, plus the population figures held by the local chiefs for the seven incomplete villages, gave a population of the health zone estimated at 20,106. (The chiefs update the figures



Map 2. Boga Health Zone

every year as the population is required to be registered annually). The villages were grouped into four strata by size, and villages were selected randomly from within each stratum. The total population and the households interviewed within each of the four strata are shown in Table 4.2.

The census was used to identify households with children under five years of age. Within each stratum, random number tables were used to select villages until the population selected was proportional to the number of people living in villages of that size for the total population. All households in the village with children under five years of age were selected, except in the two strata containing the largest villages (500-749 and over 750 population), where the households required were randomly selected from two villages in each stratum, half from each village. The inclusion of all or nearly all eligible households within each village made field work and logistics easier and reduced the cost and time required, whilst preserving statistical precision. The total number of households interviewed was 547, more than the 500 originally

Table 4.2
TOTAL POPULATION AND HOUSEHOLDS INTERVIEWED IN BOGA, BY STRATA

Population per village	No. of villages in stratum	No. of villages selected	Sampling fraction (f)	Population in stratum		Population in selected villages		Sampling Fraction (f)
				No.	%	No.	%	
< 250	23	6	.26	4073	20	790	24	.19
250-499	20	7	.35	7770	39	1176	36	.15
500-749	7	2	.29	4004	20	618	19	.15
>=750	4	2	.50	4259	21	720	22	.17
Total	54	17	.31	20,106	100	3304	100	.16

calculated, because it was decided to adhere to the principle of interviewing all eligible households in the village (in the two smallest strata), whether listed in the census or not. This led to a slight over-representation of the population living in small villages, but this was felt to cause less bias than the exclusion of people living in slightly remote locations who were not in the census.

The villages were not stratified by the main occupation of the inhabitants (cattle-raising or subsistence agriculture), but the random selection resulted in a representative sample of these two occupations being chosen. In the zone, there were four villages with 1580 inhabitants, or nine per cent of the total population, where cattle-raising was the main economic activity. The sample reflected this pattern: two of the four cattle-raising villages were selected, yielding 47 eligible households with a population of 376 or 11% of the sample total.

The child health programme had located its sessions to be within five kilometres of all households in the zone, except for four villages which had a total population of about 550, and which were distant from the centre. One of these villages (20 households with children under five years of age) was selected in the sampling. It had had sporadic visits from mobile teams to immunize children, but no weighing or health education activities had been carried out.

Some villages blended into each other, but the local chiefs and VHWs were helpful in deciding on the population boundaries when questions arose. Similarly, some villages had two or more names. Again, potential confusion was sorted out in preliminary discussions with chiefs and health workers. Local people, often the VHW, helped to locate the households and sometimes to assist with translation difficulties. If a woman was absent, a second visit was made, and if she was absent on the return visit, the interviewers were instructed to choose the nearest eligible household. If this failed to yield a suitable candidate within a 10-minute walk, the VHW was asked to suggest an alternative household, preferably one which had had an infant born since the census was done 10 months previously. This problem was encountered infrequently.

4.7.2 *Development and pre-testing of the questionnaire*

The prototype questionnaire, which had been developed in London, was discussed first with the missionaries, two of whom were a doctor and a nurse who had been living in the area for four years and knew the population well. They arranged for the author to meet on three occasions with a group of parents and grandparents to discuss issues of child care and local patterns of behaviour related to feeding, illness, and decision-making in families about children, and whether these had changed since the medical service began seven years previously. The student nurses (some of whom were married and had children themselves) who knew the area also provided information on local beliefs and practices in child care. Groups of six to eight adults (usually an extended family plus a few neighbours) from the two tribes talked to the author on three occasions about their economic life, farming, animal-raising, housing, and relationships within families and villages. These discussions provided ideas for the types of questions which would be of most interest for the survey as well as background information useful for the interpretation of responses. A group of wives of theology students from the Boga area and other parts of Zaire were available for three long discussions on child care subjects. As most of them could not read or write, they were thus fairly representative of the educational level of the local women and were helpful in devising ways of asking questions which were easily understood and precisely answered.

The author conducted the interviews in French when possible; otherwise an assistant translated the questions and responses. The author understood enough Swahili to ensure the translations were adequate. Once enough background was gathered to point to the kinds of questions which would be of most interest in the survey, the author prepared a draft questionnaire in French and had it translated by a student nurse into Swahili, and then independently translated back into French by second student nurse. The same translation process was followed from French to the two local languages, Kingiti and Kihema, using student nurses who were native speakers of the relevant language. In the event, only 12 questionnaires were completed in Kihema and nine in Kingiti, a total of 21 or four per cent. The other 526 questionnaires were administered in Swahili.

After training, two second-year students, working as a team and accompanied by the author, pretested this draft questionnaire by interviewing 15 local women each. The questionnaire was modified slightly during this process until the final version was determined. Each interview using the final version of the questionnaire took between 30 and 45 minutes to administer.

4.7.3 *Training and supervision of interviewers*

Once the questionnaire had been finalized, student nurses were trained as interviewers. Six first-year students were trained and worked in pairs for two weeks, then six second-year students were trained in addition. Each of these students then worked with one of the students from the previous group, giving a total of six pairs. Some, but not all, of the students came from the local area. One member of the pair could speak the local tribal language in case the woman being interviewed did not speak Swahili well. There were ten male and two female students, all being considered the most capable students in their class.

On the first day of training, the objectives of the study and the objectives of each section of the questionnaire were explained. The rationale for each question was discussed, and the reason for asking the question in a specific fashion was explained. On the second day, this process was reviewed and completed. The students were then taught how to measure arm circumference, weights and heights, practising on each other and on local children brought into the classroom. Inter-observer and intra-observer differences in measurement were described and their significance discussed, and each student was observed doing each measurement by the author. On the third day, role plays were carried out as a basis for discussing the art of interviewing and especially the art of probing and spontaneous translation. On the fourth day, each pair carried out two interviews with women from a village not in the sample while being observed by the author. The performance of the students was reviewed and difficulties and problems discussed on the fifth and last day of training.

During the actual survey, the author supervised 48 complete interviews and supervised parts of others, so that each pair of interviewers was observed conducting two or three interviews at least twice a week. The interviews were conducted over seven weeks in March and April 1987.

The composition of the teams changed frequently, giving 26 combinations of six pairs of students. This was done deliberately to minimize the effect of inter-team differences, and to ensure that a team had the right language skills and that at least one was a reasonably good interviewer.

At the end of each day's work, the questionnaires were reviewed by the author and errors discussed. Those errors which could be corrected were given back to the interviewers to revise the next day. Height measurements in the first village sampled were generally poorly done (most of the errors were made by one pair of students) and two who were more accurate in their technique re-measured 44 of the 67 children who had been measured in that village. All the students were given further training in height measurement. The schedule of visits to villages was determined before the start of work so that the chiefs and VHWs could inform the local population of the time and purpose of the visit, and ask mothers to stay close to their homes on that day.

The author assigned the teams to the villages and divided up the day's work between the pairs of interviewers. During the interviews, other women and children were usually present and sometimes the husband or brother of the woman was also present. This appeared to have an inhibiting effect in only a small number of cases. It was not difficult to prevent others from prompting or influencing the responses of the woman interviewed. No women refused to be interviewed.

The results likely to be of most interest to the people were hand-tabulated and a report on each village was prepared and given to the chief of each village, the VHWs and the Zone Medical Director.

4.7.4 *Anthropometric measurement*

The Salter scales used by the health service in Boga were only a few years old and were found to be accurate. They were checked once a week with a standard weight of 13.5 kg of water kept in a sealed container, as determined by a beam balance scale. The students were observed learning to measure children until the author felt their technique was good, and until the inter-observer variance was low (heights <+-1 cm, weights <+-100 gm, arm circumference <+-1 mm). They were instructed that during the interview they should carry out and read the measurements together and ensure that they agreed on the figures to be recorded. Questionnaires were edited and coded by the author, and checked manually for errors. Data were then checked by the author for inconsistencies using SPSS-X.

4.7.5 *Method of analysis*

The index child's utilization of the clinic sessions was measured in two different ways. "Attendance rate" refers to the number of times the child attended clinic sessions as a per cent of the total possible times that s/he could have attended. The number of weighings is simply the number of times the child was weighed; it is obviously directly related to the child's age. The two were strongly associated (X^2=82, 6 d.f., $p<0.001$) and results of the Chi-square tests and the logistic regression in Chapter 7 show that there was little difference between the two for measuring the effect of the mother's presence at child health sessions on knowledge and practices.

The child's attendance rate would not in all cases be equivalent to the number of times the mother herself had been present at a session. However, mothers generally brought their children to a session rather than send them with another person, and as there was no way of finding out the number of times the mother had been to sessions, the child's attendance rate is used as a measure of the mother's attendance.

In order to interpret whether an apparent association between two variables is likely to be causal, it is necessary to control for potential confounding variables. Confounding variables are factors which distort the apparent magnitude of the effect of a study factor. They are determinants of the outcome and are unequally distributed among the exposed and unexposed (*Last* 1983). In this study, a confounding variable would be associated with both attendance and knowledge and practices, while not being a consequence of attendance. The most important potential confounders were considered to be the following:

1) Tribe: The tribal group transmits and reinforces various customs, and is related to the way people earn their living and their diet (*Heggenhougen and Shore* 1986).

2) Educational level of the child's mother: This influences her self-confidence and problem-solving ability and is likely to incline her to the use of modern health services (*Caldwell* 1983).

3) Educational level of the child's father: The better-educated men in the study population tended to be partners of the better-educated women (X^2=115, 12 d.f., $p<0.001$), although the absolute levels of education for men were higher. This variable was not controlled for in the

analysis, because other studies have suggested that the mother's educational level is more important in child care than the father's (*Cleland and van Ginneken* 1987).

4) Parity: The more children a woman has had, the more experience with child care she will have had. Furthermore, she may have attended child health sessions previously with her older children, thus had the opportunity to attend a greater number of sessions than a woman with only one child.

5) Socio-economic level: A household's socio-economic level affects its capacity to utilize health services, respond to treatment and advice, and more generally to feed and care for their children (*Lechtig et al* 1978). The community was fairly poor, and it was difficult to find discriminators between economic strata. Only a small proportion of the local population were in salaried employment, and surrogates for income had to be used. Local informants estimated that less than 10% of households owned radios, bicycles or sewing machines, and they advised that information be collected on six variables: type of housing, source of lighting, crops grown, cows owned, and the presence of a male partner and his occupation (Table A3).

The great majority of houses were made of mud and wattle with a thatch roof. During pre-testing, people indicated that they would prefer to spend any extra money on building a kitchen which was a separate building from the living and sleeping areas, and so the site of the kitchen (i.e. in a separate building or not) was used to distinguish between the two poorest types of housing. The best type of housing was indicated by a zinc roof. The survey also collected information on the kind of lamp used, if any, as the ability to buy kerosene was thought to indicate some surplus after basic needs of food and clothing were met. The type of house correlated strongly with the kind of lamp used ($X^2=79$, 4 d.f., $p<0.001$), so that the type of house rather than kind of lamp was used in the analysis for determining socio-economic level.

A composite score for socio-economic level was devised from the six variables. Local informants claimed that a woman in this society who was not living with a male partner was usually economically worse off than a woman who had a partner, whether she lived alone or as a dependent on another male relative. The score for socio-economic level reflected this; women without partners lost the one point given for presence of a partner and up to four points for his occupation.

The general approach of the analysis was to use the Chi-square test to discover the basic associations between the mothers' knowledge and practices, and their attendance rate. Other characteristics which were thought to be potential confounders (see above) were also tested for association with the same knowledge and practice variables. If an association was found, the Mantel-Haenszel test was used to test for the effect of attendance, controlling for the potential confounders. Although confounders may act to spuriously exaggerate or spuriously mask the relationship between the exposure (attendance) and the mothers' knowledge and practices, the effect is more commonly found in the direction of showing a spurious relationship. Therefore, only those potential confounders which showed an association with knowledge and practices were tested by the Mantel-Haenszel test. Finally, a logistic regression analysis was carried out.

4.8 Limitations of the Methods Used in the Survey

The lack of an accurate and up-to-date census for the survey meant that some households were not included in the sampling frame. In three of the seven incomplete villages these houses were likely to have been the slightly more isolated ones. However, in the other four villages, the census was not completed because of opposition from the local chief, who refused the students permission to work. In villages with an incomplete census, the official population statistics which local chiefs were required to prepare every year for the state were used. These statistics were as likely to exaggerate the numbers of inhabitants as to understate them.

The fact that the census was ten months out of date at the time of the survey meant that the households in which a first child had been born in the interval would not be in the sampling frame, nor would immigrants who had arrived in the interval. The rate of in-migration was not known, but was not considered by local informants to be high. The birth rate for the programme area was not known. Using the estimated crude birth rate for Zaire of 46/000 (*World Bank* 1987), there would have been 764 children born in the 10-month interval. There was an average of 6.1 members per household, or 3265 households in total in the zone. The sampled households represented 17% of total households, so that it can be estimated that 130 children were born to households included in the sample (although these births were not spread equally between households, as they would occur in households where the parents were in their reproductive years). The total fertility rate for Zaire is estimated as 6.3 (*World Bank* 1987). About 1/6 of children born would be first-order births, so that about 20 primiparas were thus not included in the sample who might have been if the census had been up-to-date. Even allowing for the few households where all previous children were over five years of age, the number of children who were not included in the sample as a result of the census being out of date was likely to be less than 40.

The student nurses who carried out the household interviews were co-operative and interested in the study, but their enthusiasm flagged after they had spent several weeks interviewing. By the end of the period they tended to hurry the mothers through the questions. They did not always follow the instructions that both members of the team should look at the anthropometric measurements before deciding on the figures to record, and the height measurements in particular were not always well done. Age was considered to be accurate in this area, as children were registered annually in the chief's census, and few people had difficulty in finding their census record with the child's birthdate if they did not remember it spontaneously.

Using student nurses, representatives of the modern health care system, as interviewers had a disadvantage in that the mothers probably tried to give answers they knew conformed to the practices which were advised at the child health sessions, as opposed to their actual practices. In addition, a few questions required a lengthy recall period, such as the question about when the child started to eat certain foods.

The equipment for measuring height was unsatisfactory and contributed to the inaccuracies in measurement. It consisted of a microtoise, plus two pieces of wood which formed the rigid frame needed for taking accurate measurements. This was necessary in field conditions where earth floors were not flat and walls were neither smooth nor at a 90-degree angle from the ground. A design recommended by AHRTAG (*WHO* 1983) was used which consists of a footplate on which the child stands and a vertical board which fits onto the footplate at a 90-degree angle. The child stands on the footplate with his back against the vertical board. The microtoise is suspended at the correct point on the vertical board (six metres above the footplate) and the headpiece is lowered onto the top of the child's head. A shorter microtoise more suitable for measuring children's height is not manufactured.

Various problems were encountered: the vertical board did not always remain at a 90-degree angle from the footplate, as the action of extending the tape down onto the child's head tended to pull the vertical board forward slightly. Also, in order to carry the long vertical board from house to house, it had to be cut in two and a hinge placed in the centre, so that it could be folded and carried easily. By the end of the field work, some of the hinges were slightly loose and the bottom half of the board was not exactly flush with the top half. It would have been more satisfactory to construct an apparatus which used a tape measure nailed to the upright board and a separate piece of wood to press against the top of the child's head.

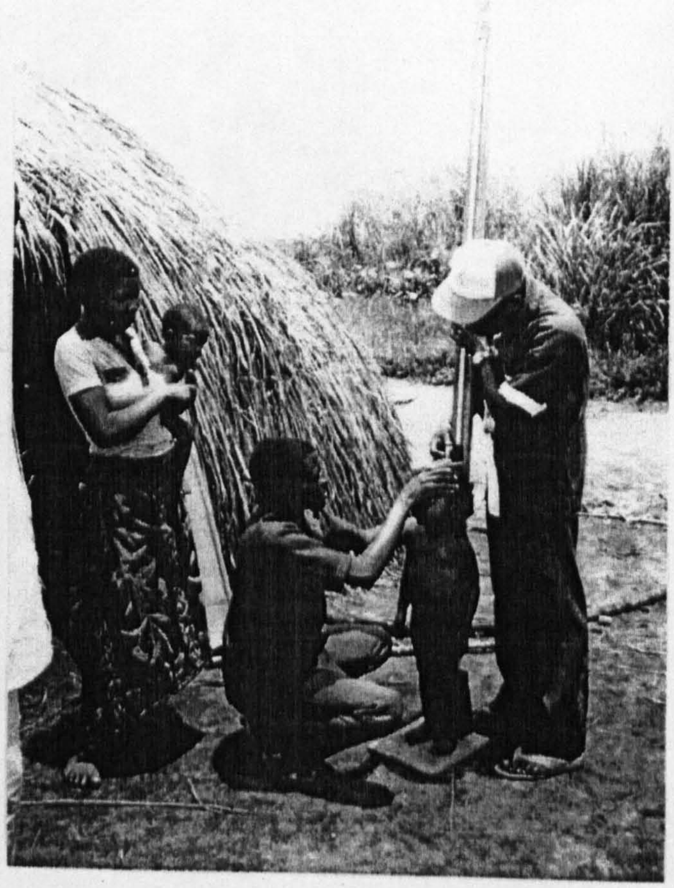
A length-measuring cradle was also constructed to measure the length of children who could not stand. Although it is recommended by WHO (1983) to measure the length of children who are two years or younger, the nurses and parents objected to using the cradle for all but the youngest children, because they felt that it resembled a coffin. Therefore, children who could stand were measured standing up, with the microtoise, rather than with the cradle. Many children were unco-operative and measuring the height accurately proved to be difficult. Again, another design would have been desirable, but it was not possible to delay the start of the research in order to locate suitable wood and a competent carpenter to construct new measuring equipment, as the health service and the nurse training programme had already been re-organized around the student nurses' availability for the research.

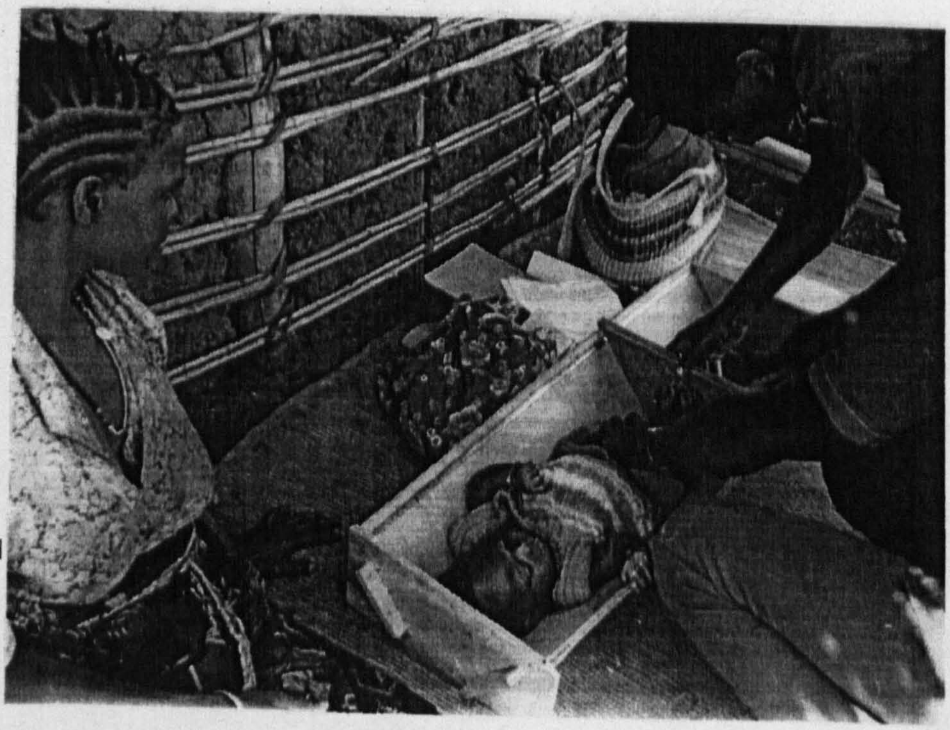
All measurements were taken in the months of March and April. It was not known what effect seasonality had on the growth of children in this area. The harvest of beans and peanuts (the chief source of protein locally) began at the end of March, which meant that the price of these items was highest in the few months previous to that. The other staples, cassava, bananas and sweet potatoes, were available year-round. These conditions are similar to those in Kasongo where no effects of seasonality were found (Section 3.6.1). A total of 685 children had valid weight and height measurements. A minimum of 200 children in each sex and age-group are necessary to have a representative sample of the growth profile of a population (*Waterlow* 1977). As there were not sufficient numbers of children measured in the sample, the growth profile cannot be claimed to be representative of this population.

CATTLE HERDERS IN BOGA HEALTH ZONE

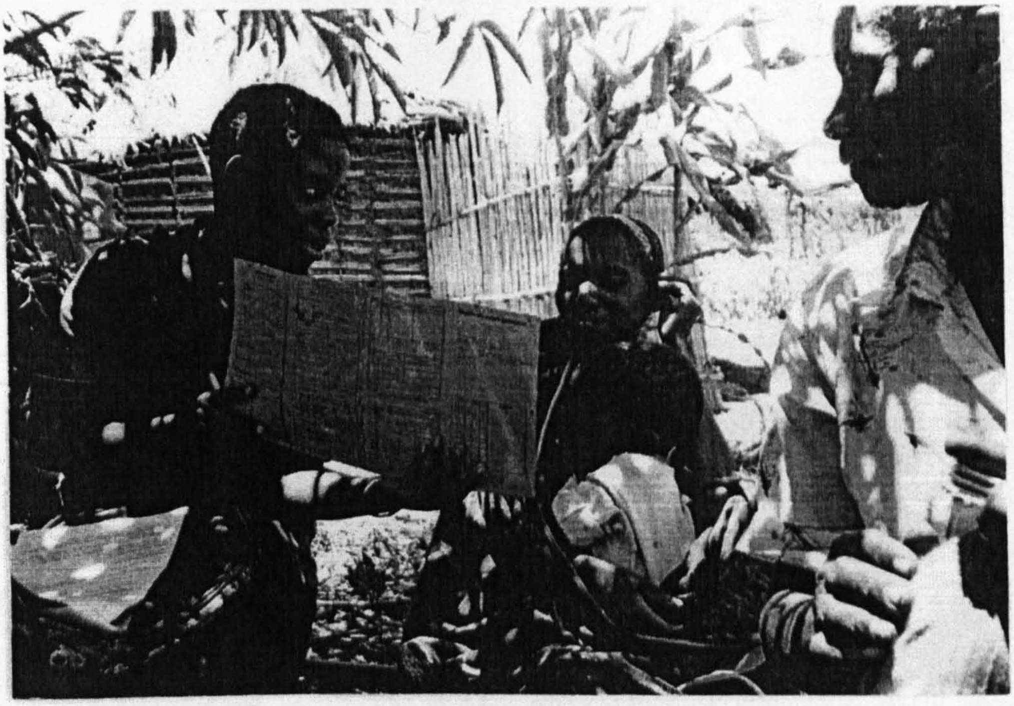
TYPICALLY MOUNTAINOUS AREA OF BOGA HEALTH ZONE

STUDENT NURSE GIVING IMMUNIZATIONS AT A CHILD HEALTH SESSION IN BOGA

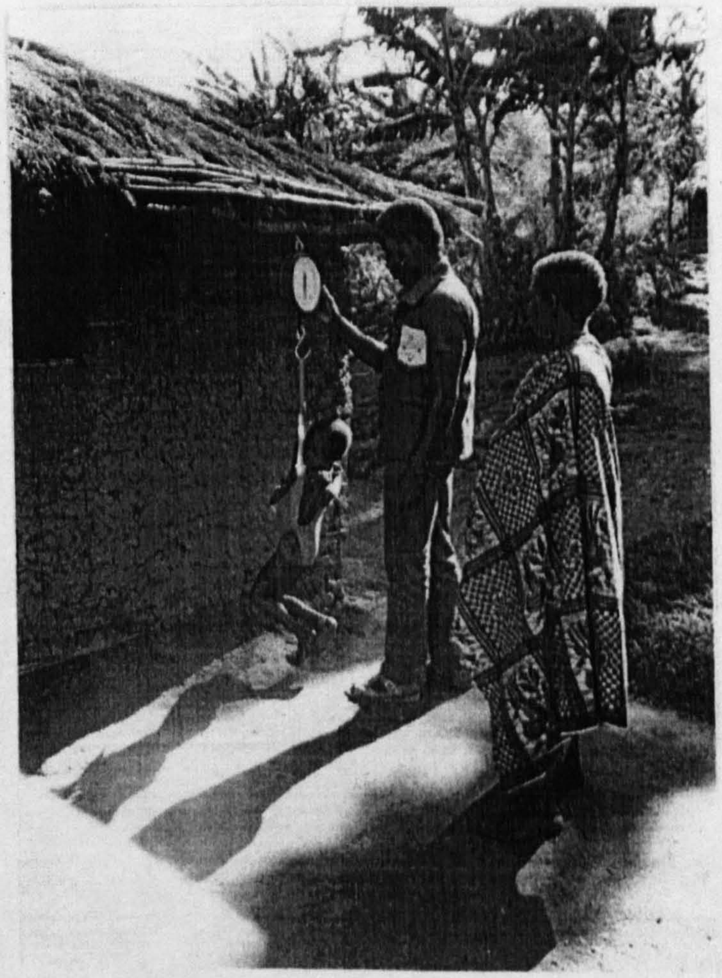




STUDENT NURSES MEASURING HEIGHT AND LENGTH OF CHILDREN DURING THE COMMUNITY SURVEY IN BOGA HEALTH ZONE



STUDENT NURSE ASKING A MOTHER ABOUT GROWTH CHARTS
DURING THE COMMUNITY SURVEY IN BOGA HEALTH ZONE



STUDENT NURSE WEIGHING A CHILD
DURING THE COMMUNITY SURVEY

CHAPTER 5

RESULTS OF CLINIC OBSERVATIONS AT BOGA, KASONGO, AND KATANA

5.1 Organization of the Child Health Sessions

5.1.1. *Boga*

In the Boga programme area, the child health sessions had been run for the past four years by two supervisors with the help of VHWs and student nurses. Each supervisor held mobile clinics in villages in his area once a month. The supervisor in one area was sometimes accompanied by a student nurse and travelled by motorcycle or on foot. The other supervisor travelled mostly by Land Rover, when he was accompanied by one or two student nurses and a local woman trained as a clinic helper.

The VHWs began the sessions by weighing the children and charting their weights. They then placed the charts in order on the consultation table. When most mothers had arrived, the VHW or the supervisor gave a health talk, after which the VHW resumed weighing, while the supervisor and student nurse began the consultations and immunizations. They examined the child's growth chart, registered his or her presence in a record book, and gave the mother advice and the child any necessary immunizations. The mothers were then free to go home, unless they needed to get medicine from the supervisor or student nurse. If a child had been absent for over three months or was found during the consultation to be malnourished, the supervisor was supposed to instruct the VHW to visit the child in the home and advise the mother about feeding, care of any illness and the importance of weighing the child regularly. Back-up services for the treatment of illness were available in the health centres and hospital. There was no specific programme for treating malnutrition, except to give hospitalized ill children who were also malnourished a small amount of cow's milk daily.

In 1986, there was an average of 52 children per session, with a range of 42 to 120. There were one or two staff doing consultations, giving a mean of 42-77 children per worker per session.

5.1.2 *Kasongo*

In the Kasongo project area, growth monitoring was carried out in health centres and mobile clinics. The four nurses observed had had between one and 19 years experience, and the clinic aide who was observed had had one year's experience. Although the supervision system in Kasongo is unusually well-organized, child health sessions were "rarely" observed by the doctors, perhaps once a year out of an average of 50 supervisory visits per year to health centres (*Melotte* 1987). The reasons given were that some doctors found them boring and believed that they were working reasonably well, and conversely, that other doctors did not believe in the usefulness of the child health programme as currently organized. The programme had been discussed by the doctors on several occasions, where they had recognized the need to improve the skills of the nurses in screening, to systematize the interventions to be applied to children with growth faltering, and to revise the algorithms accordingly. The discussions had only resulted in action to improve the skills of nurses in communicating with the population, believed to be a fundamental constraint to the effectiveness of the health service in general, including the child health services (*de Brouwere* 1988).

Sessions were held once or twice a week in urban health centres, staffed by the clerk, nurse, "planton" (watchman) and a clinic aide. In the rural areas, one of the two weekly sessions was a mobile clinic run by the nurse and clerk, assisted sometimes by a local volunteer. The health committees, which had administrative and financial responsibility for the operation of their health centres, had supported growth monitoring activities by advertising the times of sessions, by encouraging parents to attend, and occasionally by discussing the importance of immunization with members of the community. Back-up services were available at the health centres and hospital.

The rural health centres had a nutrition rehabilitation programme, run by the clinic aides who had been trained on-the-job by the nurse. Mothers were asked to bring their child and some food to the health centre every morning for one to two weeks, where the aide enriched the food with soyaflour or dried fish. Mothers cooked the food and fed it to the children. During this time, the aide was supposed to teach the mothers about child nutrition. Only three sessions were observed; in these, the aide talked very little to the mothers and gave no instruction, as she was occupied with other duties in the clinic. This programme was considered by the physicians to be a failure. In the hospital there was an intensive programme to feed children with produce from the hospital garden in which parents worked, and of educating parents and keeping a close surveillance of children's progress. It was the practice to refer only children with very severe malnutrition to the hospital from the rural areas; most were cared for at the health centres.

At the start of a session, the watchman and/or clerk weighed each child and noted on the record card retained by the mother the date, weight and the percentage of the reference curve the weight represented. The clerk retrieved the children's growth charts from his files and placed them on the consultation table. The nurse or clinic aide carried out the consultations, which included plotting the weight on the growth chart from the information on the mother's record card and giving advice to the mother. Group health education was carried out when most of the weighings were finished and before starting the consultations. At mobile clinics, the nurse immunized children after finishing the weighing and consultations, whereas immunizations were usually organized at separate times in the sessions held at health centres. Ante-natal care was also provided at the end of the child health sessions. Some nurses also dispensed medicine for malaria, diarrhoea, anaemia and worms at little or no cost during sessions, in the health centres whose financial position allowed this.

In 1986, the mean number of children per session ranged from 25 to 110, the overall average being 48. There were either one or two workers doing consultations, with between 25 and 94 children to be seen per worker per session.

5.1.3 *Katana*

In the Katana project area, the sessions were conducted by graduate nurses assisted by two to four auxiliary workers. Most of the auxiliaries were employed at the health centre full-time although some were hired specifically to work at growth monitoring sessions. They also made home visits to children who had been absent for three months to encourage the mothers to attend, and occasionally to malnourished children. The auxiliary workers had been taught on-the-job by the nurse and other auxiliaries either at their own health centre or at the sessions held in the hospital grounds. By the end of their four-month training period, they had worked at about 64 child health sessions. Seven of the 19 health centres had an active health committee, which supported the growth monitoring activities in various ways, most commonly by constructing shelters to shield waiting women and children from the sun. Back-up services were available at the health centres and hospital.

The nutrition rehabilitation programme run at the health centres varied in quality but was on the whole more comprehensive than the programme in Kasongo and the nurse played a more active part. The mothers and children spent a morning a week at the health centre, where the children were weighed, and the mothers received both individual and group health education, after which they cooked various dishes with ingredients they had brought and fed the children. In the hospital there was also a programme of feeding, education and surveillance of malnourished children.

Each health centre devoted one to two days per week to child health sessions, which were held both at the health centres and as mobile clinics in villages. Considerable supervisory attention had been given to the child health sessions: in 1986 the nurse-supervisor spent six months concentrating on this alone. He visited each health centre three times, the first time to look at problems in the organization of activities, the second to look at how the immunizations were done, and the third time to see if the recommendations had been acted upon.

When the mothers arrived at a session, they first gave their child's booklet to an auxiliary who weighed the child and wrote the date and weight in the booklet, after which they lined up at a table where the child's growth chart was located by another auxiliary. They then queued for the consultation with the nurse or auxiliary, when the weight was plotted on the chart and advice given, and finally, near the end of the session, they queued for immunizations. At one health centre, they queued a fifth time to have the immunizations recorded on their chart. The group health education was carried out by an auxiliary near the beginning of the session, when 20-30 mothers had arrived, and was repeated later once or twice after a new group of mothers had arrived.

In 1986, the average number of children attending per session ranged from 133 to 370, with an average of 254. There were two to four workers doing consultations, giving between 66 and 118 children per worker per session.

5.2 Number of Observations Made

The consultations were observed beginning five to ten minutes after the nurses had started them. The researchers watched several consultations without recording any observations, then when it was thought that the worker was less aware of the researchers' presence, the consultations were recorded.

A total of 520 consultations by 31 workers were observed in 21 sessions. Details of the different types of workers observed are given in Table A2. In Kasongo, sessions at three of the 15 rural health centres and two of the four urban centres were observed. In Katana, observations were made at the health centre in the hospital grounds and at eight of the 18 rural health centres. Six of seven sessions observed in Boga were mobile, in Kasongo two of five, and in Katana, three out of nine.

5.3. Attendance and Health Status of Children at the Sessions

Tables 5.1 to 5.5 show the patterns of attendance of children at the sessions observed, by age, weight status and diagnostic category.

Table 5.1 shows the ages of children observed during the consultations. In all three programmes, children under 12 months of age made up about one-third of those present. In Boga, there was an especially high percentage of children under six months, consistent with the data from the household survey which showed that 31% of all six-month olds had been weighed six times, and 47% five times. Attendance fell steeply after 23 months of age in Kasongo; only 27% of children attending were 24 months or older. In Boga and Katana, attendance fell after 35 months of age. In these two programmes, 17 to 26% of children were 36 months of age or older. It is not known whether this was representative of attendance in general, as the programmes did not routinely record the ages of children who attended sessions.

Table 5.1
AGES OF CHILDREN OBSERVED AT CHILD HEALTH SESSIONS

Age (months)	*Boga No.*	*cum. %*	*Kasongo No.*	*cum. %*	*Katana No.*	*cum. %*	*Total No.*	*cum. %*
0-5	23	19	13	11	22	8	58	11
6-11	19	34	23	31	60	30	102	31
12-17	19	49	30	57	34	43	83	47
18-23	13	60	19	73	23	52	55	58
24-35	28	83	16	87	58	74	102	78
36-47	13	94	8	94	39	89	60	90
48-59	8	101	7	100	32	101	47	99
Total	123*		116*		268		507	

* Age was not recorded for 11 children in Boga and 2 children in Kasongo.

Table 5.2 shows the number of months since the child's last attendance at a session. Attendance appeared to be most frequent in Katana where 82% of children had attended either or both of the previous two sessions, compared to 66% in Boga and 54% in Kasongo. Similarly, Boga and Kasongo had the highest rate of children who had missed at least the four previous sessions, with one-fifth of children in this category, while Katana had 12%. These data for Katana are especially interesting in the light of the higher proportion of children 36 months or over in this programme, the age-group in which attendance usually falls.

Table 5.2
FREQUENCY OF ATTENDANCE OF CHILDREN OBSERVED AT THE SESSIONS

No. of months since last attendance	*Boga*		*Kasongo*		*Katana*		*Total*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
1	36	44	27	31	149	56	212	48
2	18	22	20	23	70	26	108	25
3	10	12	22	25	16	6	48	11
4 or more	18	22	19	22	33	12	70	16
Total	82*	100	88*	101	268	100	438	100

* Only those children whose month of last attendance was recorded are presented. In Boga and Kasongo, month of last attendance was not recorded by the researcher for 52 and four children respectively. In Kasongo, a nurse started a mobile clinic in a new village, so that 26 children were being weighed for the first time. These 26 children have also been excluded.

Assessing the frequency of attendance at child health sessions by using data from only the children present at a given session is likely to produce an over-estimate of the frequency of attendance for the population as a whole. To assess how representative these data were, they were compared with information about attendance from other sources. The household survey in Boga showed that 23%

of children with growth charts had attended less than 50% of the total possible sessions (Table A4). Table 5.2 indicates that 34% of children had not attended within the last two months, corresponding to 50% of the total possible sessions. Thus, the observations from the child health sessions give a deceptively low impression of attendance rates in the Boga programme.

To compare the representativeness of attendance rates from the sessions in Kasongo and Katana, health centre records were examined for information on the number of new registrants in the child health programme in 1986. The population served by each health centre and the birth rate were known quite accurately. The number of births was multiplied by three to get a rough estimate of the total number of children under three years of age, which was compared to the total number of children attending in 1986. (The number of infants dying in the first year of life was not subtracted, as that was felt to compensate for the children over 36 months of age who did attend the sessions). An estimate of coverage was calculated in this way.

The 1986 monthly reports from eight health centres in Kasongo showed they had registered 68-104% of children under 12 months of age. (More than 100% was possible as some children may have been from outside the formal boundaries of the catchment area, and some, usually immigrants, may have been older than 12 months of age when they first registered). From the monthly reports, the mean number of children attending each monthly session represented 26% of all children under 36 months (range 7-50%). Table 5.2 shows that 31% of children observed in the consultations had last attended during the previous month, five per cent higher than rates derived from the monthly reports.

In Katana, the number of children newly registered in 1986 ranged from 65-103% in seven health centres where the size of the population was known accurately. The health centre statistics on attendance indicated that 66% of children under three years of age attended every month. Table 5.2 shows that 56% of children attending had been at the last session. However, one-quarter of these were over 35 months of age, which may have lowered the clinic rates, as older children tended to attend less frequently.

Table 5.3 shows the number of children in each age-group who had lost weight or had gained insufficient weight since their last attendance, both subsumed under the term "growth faltering". A rate of weight gain which was not at least parallel to the reference curve on the chart was classified as insufficient weight gain. In Boga and Kasongo, 41% and 38% of children under 12 months had either lost weight or not gained sufficient weight, as compared to 18% in Katana. The highest rate of growth faltering was 56%, in the cohort aged 12-23 months.

Table 5.3
NUMBER AND PERCENT* OF CHILDREN WITH GROWTH FALTERING OBSERVED AT THE SESSIONS, BY AGE-GROUP

Age-group (months	*Boga*		*Kasongo*		*Katana*		*Total*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
0-5	8/22	36	3/10	30	2/22	9	13/54	24
6-11	9/19	47	8/19	42	14/60	23	31/98	32
12-23	24/32	75	22/38	58	25/57	44	71/127	56
24-35	19/28	68	5/11	45	27/57	47	51/96	53
36-47	6/13	46	3/7	43	20/39	51	29/59	49
48-59	5/8	63	1/6	17	17/32	53	23/46	50
Total	71/122^	58	42/91^	46	105/267	39	218/480	45

* Per cent refers to the total number of children for whom weight direction is recorded in that age category.

^ Age and direction of weight were not recorded for all children as explained for Tables 5.1 and 5.2.

In reviewing studies of malnutrition, Waterlow (1980) noted that the highest rates of clinical malnutrition occurred in children 12-35 months of age, although growth faltering after birth began at around four months of age. In the children observed, 24% under six months of age had experienced growth faltering. There was a difference of only 6% between children 12-35 months and children 36 months or older who had growth faltering. However, the rates in Table 5.3 are from children attending a clinic, not from a representative sample of a population. Even though attendance tends to decrease after children are deemed to be relatively safe from life-threatening illness, the mothers may have brought older children who had been ill to the session in order to check on whether they had lost weight and to obtain the nurse's opinion and advice, and if necessary a referral or some medicine. The advice at child health sessions was free, once registration had been paid. If an older child had not been ill recently, the mother might be less inclined to bring the child to a weighing session.

Table 5.4 shows that 45% of children had failed to gain weight adequately since the last session, ranging from 39% in Katana to 56% in Boga. Of children with growth faltering, 57% had recently been or were currently ill, compared to 35% of children who had gained weight adequately. The percentage of mothers in Katana whose child had gained weight but who reported that the child had been ill since the last session was much higher than in the other two programmes (44% versus 14% and 31%). Although this could be a real difference, it might simply be due to the fact that the nurses in Katana asked more frequently whether the child had been ill. Seventy per cent of all mothers were asked about illness in Katana, whereas only 33% of mothers were asked in Boga and 48% in Kasongo.

The author assessed whether a child was ill or not on the basis of the health workers' comments and questions and the mothers' answers. If no information was obtained by the health worker or volunteered by the mother, the child was recorded as not ill. However, information about illness was obtained in only 65% of children with growth faltering, so that the real rate of illness could have been very different. The Katana figures recorded for children currently ill may be slightly higher than was the case in reality, as the health worker could see in the children's

Table 5.4
ILLNESS AND DIRECTION OF WEIGHT CHANGE OF ALL CHILDREN

	Boga		*Kasongo*		*Katana*		*Total*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
1. <u>Children gaining weight</u>								
Ill since last attendance	8	14	15	31	71	44	94	35
Not ill since last attendance	50	86	34	69	91	56	175	65
Sub-total	58	44	49	53	162	60	269	55
2. <u>Children with growth faltering</u>								
Ill since last attendance	47	63	20	47	61	58	128	57
Not ill since last attendance	28	37	23	53	45	43	96	43
Sub-total	75	56	43	47	105	39	223	45
Total	133*		92*		267		492	

* In Boga, weight was not recorded for one child. In Kasongo, 26 children were attending for the first time. In Katana, one child was weighed for the first time.

health booklet whether they had been treated or not, and would not need to ask the mother in every case. The researcher may thus have misclassified some children who had been treated as currently ill. In Kasongo, some children may have had treatment recorded on their chart, but these were probably very few. In Boga, no written information would have been available to the health worker.

In Tables 5.5 to 5.12 children's risk status is categorized in the same way that the health workers have been taught to do in each programme. The care that they gave to the children could thus be assessed using the health workers' own system for classifying and managing children. The following diagram shows the classifications of children:

ILL ——>	Growth Faltering	<—— NOT ILL
	Adequate weight gain	

Children could be classified in four main ways: ill with growth faltering, ill but gaining weight adequately, not ill with growth faltering, and not ill with adequate weight gain. If the child was attending a session for the first time, the health worker used only the criterion of illness to classify children. Growth faltering was judged slightly differently in the three programmes. In Boga, weight velocity was the only criterion for judging whether children's growth was adequate. In Kasongo and Katana, health workers used both weight velocity and attained weight to judge whether growth was adequate. Children in these two programmes had to both be above the lowest weight curve on the growth chart and to have gained weight adequately since their last weighing, in order to be considered as not showing growth faltering.

Children who showed growth faltering and/or were ill at the time of the session were labelled by the author as "at-risk". Only those children who were not ill, had gained weight adequately and were above the lowest curve (the latter for Kasongo and Katana only) were labelled as "well", following the system used by the health workers. For first-time attenders where there was no information on weight velocity, those who were not ill were classified as "well".

Table 5.5 shows that slightly less than two-thirds of children at the sessions were classified as "at-risk" either because they had growth faltering since their last attendance or because they were ill at the time of the session. All three programmes had similar rates of children at-risk, from 62% in Boga to 68% in Kasongo, with an overall average of 64%. About two-thirds of the at-risk children were so classified because they had not gained sufficient weight since their last attendance. The other one-third had gained weight adequately since the last session but were currently ill.

Table 5.5
CURRENT ILLNESS AND DIRECTION OF WEIGHT CHANGE OF AT-RISK CHILDREN

Diagnostic Category	*Boga*		*Kasongo*		*Katana*		*Total*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Weight loss	33	25	23	22	61	23	117	23
Inadequate gain	42	32	20	19	44	16	106	21
Adequate gain but currently ill	8	6	28	27	64	24	100	20
Total at-risk	83	62	71	68	169	63	323	64
Total children	133*		105*		268		506	

* In Boga, direction of weight was not recorded for one child. In Kasongo, 26 children were weighed for the first time.

5.4 Accuracy of Weighing and Recording

In general, weights were accurately measured and charted. Table 5.6 shows that some procedures were relatively less well done: undressing children, telling the mothers the weights, and charting ages and weights. Workers knew that children should not wear "heavy" clothes, but were reluctant to ask mothers to undress children if the weather was cool. It is doubtful if this made a significant difference to the weight recorded, as a typical wool-nylon jumper and hat and plastic shoes weighed 150 gm.

Errors in charting weight were usually minor, differing from the author's assessment of the weight by no more than 200-300 grams. In Kasongo, four of the 11 errors in plotting weight were the same type of error made by one worker. Mistakes in writing the month in the correct space were more frequent in Katana and resulted in the age of the child being calculated incorrectly in 20% of charts examined. Children who were crying and struggling caused the scale needle to move around, but the staff generally studied the scales for up to half a minute before deciding on what weight to record. Their decision usually agreed with the author's; it is doubtful that any large errors in measuring weight resulted from this procedure.

In Katana, only 60% of mothers overall were told the child's weight, although this practice varied widely between staff, i.e. some workers always stated the weight and others never did. In the other two programmes, almost all mothers were told the child's weight.

Table 5.6
ACCURACY OF WEIGHING PROCEDURE

	Boga		*Kasongo*		*Katana*		*Total*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
1. Needle at zero before weighing	96	100	110	92	211	100	417	98
2. Children not wearing heavy clothes	73	76	116	97	193	91	382	90
3. Scale needle steady before being read	86	90	101	85	191	91	378	89
4. Weight read accurately (+/-100 gm.)	92	96	113	95	209	99	414	97
5. Weigher tells mother the weight	88	92	118	99	126	60	332	78
6. Current month written on chart	95	99	119	100	205	97	419	98
7. Age recorded accurately on chart*	96	100	114	96	169	80	379	89
8. Weight recorded accurately	95	98	108	91	196	93	399	94
Total children observed	96		119		211		426	

* A mistake is commonly made that results in the age of the child being mis-represented on the chart. If a child fails to attend a monthly session, the worker may forget to leave the space for that month blank. Most errors of this type were for one or two months only, but occasionally the error was made many times, and the child's weight was thus recorded in a section of the graph meant for a much younger child, giving a falsely positive impression of the child's growth.

Weighing was done quickly. Of 110 observations in Kasongo, an average of 1.4 minutes (range 1.2-1.5) per child per worker was required to weigh and write the weight and date on the mother's record card. When the tasks included finding the chart in the health centre files, the average time per child per worker for 85 observations was nearly doubled to 2.4 minutes (range 2.1-2.8). In Katana, weighing and writing the weight and date in the child's booklet took an average of 0.9 minutes in 56 observations (range 0.6-1.5 minutes). There were no difficulties in Boga with women forgetting or losing their chart, although a few charts of the older children were in poor condition and difficult to read.

5.5 History-Taking and Examination of the Child

The questions asked or physical examinations performed on at-risk children are listed in Table 5.7. Two-thirds of mothers whose children had growth-faltering were asked if the child had been ill, ranging from 59% in Boga to 72% in Katana. In other words, in one-third of children who had not gained weight adequately, the health worker failed to ask the primary diagnostic question about illness. Only 23-50% of mothers were asked if their sick child had been treated or was now better (both types of information are included in the question about treatment). In Katana, if a child had been sick and taken to the health centre for treatment, that information would have been recorded in the child's booklet, and the health worker would not need to ask these questions in all cases. However, not all children who had been ill would have been seen at the health centre, and even if they had, the worker should have asked if the child was now recovered. Despite this, the percentages for Katana probably give slightly too negative an impression of the health workers' recognition of poor growth.

Table 5.7
HISTORY AND EXAMINATION OF AT-RISK CHILDREN

	Boga No.	%	*Kasongo* No.	%	*Katana* No.	%	*Total* No.	%
1. Has child had fever since last session?	n.a.		n.a.		76/105	72		
2. Has child had diarrhoea since last session?	n.a.		n.a.		57/105	54		
3. Has child been ill since last session?	44/75	59	26/43	60	60/105	57	146/223*	65
4. Was child treated for illness?	22/44	50	6/26	23	24/60	40	52/130	40
5. Eyes checked for anaemia	3	4	35	49	81	48	119	37
6. Spleen palpated for enlargement	1	1	2	3	60	38	63	20
7. Feet examined for oedema	0	0	0	0	12	7	12	4
8. Is child eating well?	24	29	22	31	71	42	117	36
9. Has child started solid food?	0	0	4	27	1	4	5/57	9
10. Are you (mother) pregnant?	2	2	11	15	57	34	70	22
Total children	83		71		169		323	

* The figures for asking about illness combine the figures for the question about fever in the Katana programme plus the question about any illness in the other two programmes.

Note:
A lack of weight gain should be the stimulus that prompts the nurse to ask whether a child has been ill. Therefore, the numbers and percentages given for the first three questions about illness refer to the children who had not gained sufficient weight. The question about treatment of illness refers only to the children who had been ill. The question about starting solid food is applicable to three to six month-olds. The other questions apply to all at-risk children i.e. those who had not gained sufficient weight and those who were ill.

Nearly half of the at-risk children in Kasongo and Katana were examined for anaemia, and in Katana 38% were examined for splenomegaly. This examination did not take extra time, as the health worker looked at the eyes and palpated the spleen while asking the mother if the child had been ill and with what symptoms. Pedal oedema was checked in Katana when the child's weight had been faltering for several months and was below the bottom curve. Staff enquired after the child's appetite in 36% of cases, ranging from 29% in Boga to 42% in Katana.

Table 5.7 reflects to some extent the differences between the programmes in the instructions that had been given to the workers in how to carry out the consultations. In Katana, staff had been instructed to examine the eyes and spleen of the children, while asking specifically about fever and diarrhoea, and the growth chart used had blank spaces where this information was to be recorded at each session. In Kasongo, the workers were expected to check the eyes and spleen, but not to ask specifically for fever or diarrhoea; in Boga, they had not had explicit instructions.

Table 5.8 summarizes the diagnostic questions and examinations detailed in the previous table and shows the probability of at least one diagnostic procedure being carried out on children. No diagnostic procedures were applied in Kasongo and Boga to 26-34% of children with growth faltering. Differences in diagnostic procedures between children with and without growth faltering were significant in Boga, but not in Kasongo. In Katana, almost all children were asked at least one question, so that the Chi-square test did not show a significant difference. However, when the three programmes were combined using the Mantel-Haenszel test, children with growth faltering were more likely to have a diagnostic procedure than children without growth faltering, because of the strong association in the Boga programme.

Table 5.8
NUMBER AND PER CENT* OF CHILDREN RECEIVING AT LEAST ONE DIAGNOSTIC PROCEDURE, BY WEIGHT DIRECTION

Weight Direction	*Boga* No.	%	*Kasongo* No.	%	*Katana* No.	%	*All Children* No.	%
Weight loss	23/33	70	18/23	78	58/61	95	99/117	85
Inadequate gain	27/42	64	14/20	70	43/44	98	84/106	79
	X^2=0.006		X^2=0.007		X^2=0.003		X^2_{MH}=0.007	
	n.s.		n.s.		n.s.		n.s.	
Sub-total[1] (growth faltering)	50/75	66	32/43	74	101/105	96	183/223	82
Weight gain[2]	14/58	24	33/49	67	154/162	95	201/269	75
Total children	64/133˄	48	65/92˄	71	255/267	96	384/492	78
	$X^2_{1,2}$=22.0		$X^2_{1,2}$=.26		$X^2_{1,2}$=.36		$X^2_{1,2(MH)}$=10.7	
	p<.001		n.s.		n.s.		p<0.005	

* Per cent refers to the number of children in that category of weight change.

˄ Weight direction was not recorded for all children in Boga and Kasongo.

It was thought by the researcher that staff might have had difficulty recognizing inadequate weight gain, and they would therefore be more likely to ask about illness in children who had clearly lost weight than in children whose weight gain was not parallel to the growth curve.

However, only six to eight per cent more children with weight loss than children with inadequate weight gain received a diagnostic procedure, and the difference was not significant overall, as shown in Table 5.8.

5.6 Counselling of Mothers

The advice and information given to mothers of at-risk children is shown in Table 5.9. Telling the mother at the beginning of the consultation that the child's weight gain was not satisfactory was done in only 23% of cases in Kasongo and 43% of cases in Boga as compared to 72% of cases in Katana. However, Table 5.6 shows that in both Boga and Kasongo, over 90% of mothers were told at the point of weighing what the child's weight was. This sometimes included a remark on whether the child had gained or not. Staff in Boga used the chart as a visual aide to compare the reference curve and the child's weight line for about half of the mothers of at-risk children, but this was almost never done in the other programmes.

Mothers of at-risk children were treated differently in the programmes. In Boga, they most often got advice about feeding, in Kasongo they were referred to the health centre, and in Katana the workers used a combination of referral and advice about illness and feeding. An admonishment to feed the child especially well was given to 31-52% of these mothers and details about foods to offer the child were given most often in Boga (27%) and least often in Kasongo (10%). Emphasis on increased frequency of feeding

Table 5.9
ADVICE GIVEN/REMARKS MADE TO MOTHERS OF AT-RISK CHILDREN

	Boga		*Kasongo*		*Katana*		*Total*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
1. Attendance of child is irregular	10	12	7	10	42	25	59	18
2. Weight direction of child is not good	36	43	16	23	121	72	173	54
3. Thanks/congratulates mother	3	4	8	11	18	11	29	9
4. How to treat child's illness*	2/55	4	1/46	2	33/110	30	36/211	17
5. Feed child "well" (unspecified)	43	52	26	37	52	31	121	37
6. Give child specific food	22	27	7	10	39	23	68	21
7. Feed child 3 or more times a day	22	27	0	0	30	18	52	16
8. Give a specific amount of food	0	0	1	1	6	4	7	2
9. Start solid food	0	0	0	0	2	7	2	.6
10. How to encourage an anorexic child to eat	2	2	1	1	1	.6	4	1
11. Consider using family planning	0	0	1	1	1	.6	2	.6
12. Bring child to nutrition programme	n.a.		0	0	14	8	14	4
13. Bring child to health centre	1	1	30	42	57	34	88	27
Total children	83		71		169		323	

* The percentage applies to those who said their child had been ill but was not treated or was not better. The designation "n.a." means that these programmes did not offer the service.

^ This was a general admonition to the mother to give the child "lots of food" or to "feed the child well", without any specific details. All the mothers to whom the worker cited specific foods were also in the category of "feed well".

followed the same pattern, being mentioned most often in Boga (27%) and not at all in Kasongo. Other types of comment, such as congratulating a mother, advice about anorexia, feeding specific quantities of food or starting solid food, or encouraging the use of family planning, were rare.

When workers in Boga and Katana cited specific food to give children, they named foods high in protein and/or fat, being careful to emphasize lower-cost vegetable sources. In Kasongo, mothers were asked to prepare an enriched porridge for children with growth faltering, even for those well past weaning age, as the staff said that mothers would consider it as a special food and a "treatment" which they would be more likely to follow than general advice about feeding the child.

Although health workers have been taught that adequate spacing of births is a means of assuring the health and survival of children already born, they rarely mentioned the use of family planning during consultations. On interview they said that it was of no use, that people were not interested in contraception in spite of all their efforts, and also that the husbands had to be persuaded before the mothers could accept.

Table 5.10 summarizes aspects of the previous table to show the management of children who were currently ill, and the management of children who had growth faltering but no current illness. Practices varied between programmes. In Boga, almost the only response to a child's illness or growth faltering was to counsel the mother about feeding; only two of 55 mothers were given advice about their child's illness. The commonest response in Kasongo was to refer the child to the health centre, although 40% of children with growth-faltering but no illness were given advice about feeding. The Katana programme was the most active of the three in dealing with ill children, responding with a mixture of counselling about illness and feeding, and referral. Overall, three-quarters of children with growth faltering but no current illness in the three programmes were given some counselling, but only 58% of children who were currently ill were given at least one piece of advice. Children with growth faltering were significantly more likely than ill children to receive some counselling in Boga, and overall when the three programmes were combined using the Mantel-Haenszel test.

The Chi-square test was used to test for a difference in counselling given to currently ill children compared to children with no current illness regardless of whether they had growth faltering or not. In Boga, no significant differences were found between the treatment of ill or non-ill children. In Kasongo, ill children were more likely than non-ill children to be referred to the health centre (X^2=6.8, $p<0.01$), but showed no significant relationship with advice about feeding or illness. In Katana, sick children were more likely to be referred to the health centre (X^2=8.9, $p<0.003$), or to be given advice for the illness (X^2=14.6, $p<0.001$), but were no more likely to be given advice about feeding (X^2=1, n.s.). In sum,

Table 5.10
ADVICE GIVEN TO CURRENTLY ILL CHILDREN AND TO CHILDREN WITH GROWTH FALTERING BUT NO ILLNESS

	Boga No.	*Boga* %	*Kasongo* No.	*Kasongo* %	*Katana* No.	*Katana* %	*Total* No.	*Total* %
1. Currently ill:								
Advice re illness	2	4	1	2	33	30	36	17
Advice re feeding	22	40	11	24	27	25	60	28
Refer to h.c.	1	2	20	43	37	34	58	27
Refer to nutrition programme	n.a.		0	0	10	9	10/156*	5
At least one of above[1]	27	49	27	59	69	63	123	58
Total currently ill	55		46		110		211	
2. Growth faltering but not currently ill:								
Advice re feeding	21	75	15	60	25	42	61	59
Refer to h.c.	0	0	10	40	20	33	30	27
Refer to nutrition programme	n.a.		0	0	4	7	4/85*	5
At least one of above[2]	21	75	18	72	45	76	84	75
Total growth faltering but not ill	28		25		59		112	
Total at-risk children	83		71		169		323	
	$X^2_{1,2}=4.1$		$X^2_{1,2}=0.7$		$X^2_{1,2}=2.6$		$X^2_{1,2}(MH)=8.1$	
	$p<0.01$		n.s.		n.s.		$p<0.005$	

* The denominator refers to the Kasongo and Katana programmes only.

illness in children led the health workers in Kasongo and Katana, but not in Boga, to respond with referral or advice for the illness. None of them included nutritional information or therapy as part of their response, for example by stressing the importance of extra feeding to make up for the period of anorexia during illness.

Table 5.11 summarizes the information in Table 5.9. Overall, 57% of children were given some information or advice (including referral), ranging from 64% of the at-risk children to 46% of the well children. At-risk children were significantly more likely than well children to be given some advice in all three programmes; the association was strongest in Katana. The highest percentage of at-risk children given advice was in Katana (67%) and the lowest in Boga (58%).

Table 5.11
NUMBER AND PERCENT OF CHILDREN RECEIVING AT LEAST ONE PIECE OF ADVICE, WELL AND AT-RISK CHILDREN

	Boga		*Kasongo*		*Katana*		*Total*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Well Children	18/51	35	20/47	43	53/99	54	91/197	46
At-Risk Children	48/83	58	45/71	63	114/169	67	207/323	64
Total	66/134	49	65/118	55	167/268	62	298/520	57
	$X^2=5.5$		$X^2=4.15$		$X^2=5.5$		$X^2_{MH}=16.3$	
	$p<0.02$		$p<0.05$		$p<0.02$		$p<0.001$	

5.7 Time Taken for Consultations

Details of the time taken for consultations are shown in Table A5. In the three programmes, this included reading the growth chart, examining a child and questioning and advising the mother. In Boga, immunizations were also given during this time and in Kasongo and Katana, the child's weight was plotted on the growth chart. Table 5.12 shows the number of children who received two or more minutes of consultation time. The time taken for both well and at-risk children was longest in Katana, with 51% of at-risk children having at least a two-minute consultation, as compared to 33% in Kasongo and 17% in Boga. This accords with Tables 5.7 to 5.11 where the most questions and advice were recorded for the Katana programme. The longest time taken for an individual consultation in all the programmes was five minutes.

Table 5.12
NUMBER AND PER CENT OF CHILDREN RECEIVING AT LEAST TWO MINUTES PER CONSULTATION

	Boga		*Kasongo*		*Katana*		*Total*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
Well children	2/13	15	3/25	12	18/44	41	23/82	28
At-risk children	4/23	17	11/33	33	43/84	51	58/140	41
Total	6/36	17	14/58	24	61/128	48	81/222	36
	X^2=0.002 n.s.		X^2=2.5 n.s.		X^2=0.9 n.s.		X^2_{MH}=2.9 n.s.	

Overall, 41% of at-risk children received two minutes or more of consultation time, compared to 28% of well children. No significant difference was found between well children and at-risk children in the proportion who received more than two minutes for a consultation, in the individual programmes and for the three programmes combined.

5.8 Children with Prolonged Growth Faltering

Children who were considered by the author to be in special need of high quality care were those who had experienced growth faltering for more than two months if they were less than 12 months old, or for more than three months if between 12 and 35 months of age. A total of 36 children in the three programmes came into this category. (Most of the children with prolonged growth faltering had a stationary weight line, stationary being defined by the author as a weight which had not risen by more than 250 gm or about one-half of the 500 gm box on the chart for the time periods defined above. Effectively it meant that weight gain was less than parallel to the growth curves on the chart).

The care given to these children is shown in Table 5.13. In Boga, the two children who were not questioned or advised were dealt with by a student nurse who was considered to be only barely competent by his teachers. The other student nurses in Boga asked whether the children had been treated for an illness and if the answer was positive, the consultation ended at that point. Only two mothers were told to give the child extra food to make up for the period of anorexia. None were told the importance of attending the next child health session to check the child's weight. None were referred to the health centre.

Table 5.13
MANAGEMENT OF CHILDREN WITH PROLONGED GROWTH FALTERING

	Number of Children			
	Boga	*Kasongo*	*Katana*	*Total*
Questions/Examination:				
1. Has child been sick?	13	8	9	30
2. Has child been treated?	6	1	0	7
3. Eyes examined for anaemia	0	1	4	5
4. Spleen examined for enlargement	0	1	5	6
5. Feet examined for oedema	0	0	1	1
6. Is child eating well?	5	1	10	16
7. Are you (mother) pregnant?	0	0	6	6
Total Children	15	10	11	36
Remarks/Advice:				
1. Child's weight gain is poor	13	3	8	29
2. How to treat child's illness	0	1	2	3
3. Feed child "well"	5	8	9	22
4. Give child specific foods	4	1	4	9
5. Feed child more often	2	1	3	6
6. How to deal with anorexia	2	0	0	2
7. Bring child to health centre	0	4	1	5
8. Bring child to nutrition programme	n.a.	1	6	7
Number of children given no questions or advice	2	2	0	4
Total children	15	10	11	36

In Kasongo, seven of the ten cases with prolonged growth faltering were seen by one nurse who was considered to be "marginal" by his supervisor. His work was poor and the figures in the table reflect this. For two cases, he simply read the chart and dismissed the mother. He referred four of the five remaining cases to the health centre, while telling the mothers to feed the child well without giving any details. A clinic aide dealt in summary fashion with two cases, asking about illness and telling the mother to feed the child well. Finally, one case was managed well by a nurse who examined the child carefully and gave detailed advice on feeding to the mother, asking her to return in a week to check the child's weight.

In Katana, the five nurses observed did not miss any children with prolonged growth faltering and were more comprehensive in their questioning, examination and advice-giving. Two of the five nurses did not examine the children's eyes or spleen. In all cases, the mother was either referred to the nutrition programme and/or given advice about feeding the child specific foods. The six children whose weight was below the lower curve on the chart were all referred to the nutrition programme as the nurses had been instructed to do.

Overall, counselling for children with prolonged growth faltering was very inadequate in Boga and Kasongo and slightly less so in Katana. The impression is that these children were not recognized by the health workers as being in more danger than children who had had insufficient weight gain for only one or two months. On interview, most of the workers stated that they concentrated on the child's weight performance since the last weighing and did not look back over the chart for a long-term pattern; as long as there was no clear weight loss, and the child was not below the lower curve, they did not think the child was in danger from accumulated months of insufficient weight gain.

5.9 Costs of the Programmes

The share of the health service costs (excluding land, buildings and furniture) which were allocated to growth monitoring activities were calculated for the three programmes after interviewing programme managers and the health workers involved in growth monitoring.

The cost of the health workers' time was calculated on the basis of the time they spent conducting the sessions, which included weighing children, counselling and group health education of mothers, travel to and from the sessions, preparing supplies and writing reports. Staff also carried out other activities during the child health sessions, such as administering and recording immunizations, providing ante-natal care in the Kasongo sessions, and dispensing medicines in Boga. These activities took between 15 minutes and one hour approximately in the sessions observed, but it was not possible to calculate the time for them separately, as it varied between programmes and between static and mobile sessions. The relatively small amount of time required for ordering and distributing growth charts, scales and other supplies, and for the maintenance and repair of scales was not included. Scales were estimated by programme managers to last between five and ten years; the costs of the scales were divided evenly over each year for five years, rather than annuitizing them.

The methods used to obtain the information on the costs per child under five in the catchment area and per child-visit differed between the programmes, due to differences in the information available. In Boga, the total number of children registered and the number of visits during 1986 were obtained from the supervisors' records which were well kept and considered to be accurate. In Kasongo, the numbers of children were estimated by extrapolating from the figures on total attendance and new registrants which were available for eight of the 19 health centres between January and May of 1986. In Katana, information on the total attendance and new registrants for 1986 was obtained from health centre reports. Also the programme receipts for Katana were estimated from the number of children under five in the programme, as no accounting figures were obtained. Mothers in this programme paid a fee of Z10 (£0.13) per year, after paying for the initial registration of the child, whereas the other programmes charged for registration only. Receipts calculated for Kasongo did not include the value of the two cassava roots brought by each mother to the sessions. The cassava was shared between the health staff as a supplement to their salaries.

Table 5.14 shows the costs of the three programmes per child under five and per child-visit. Details of the calculations for each programme are given in Tables A7 to A9.

Table 5.14
ESTIMATED COSTS OF GROWTH MONITORING ACTIVITIES IN THE THREE CHILD HEALTH PROGRAMMES, PER CHILD UNDER FIVE AND PER CHILD-VISIT, 1986 (POUNDS STERLING)

Items	*Boga*	*Kasongo*	*Katana*
Staff	448	2286	4430
Transport	2299	568	313
Materials	177	287	15*
Scales	72	76	76
Receipts from charts, registration	498	812	2667
Total net costs	2499	2405	2167
Number of children under 5 registered	3762	10,146	34,340
Number of child-visits	27,590	73,855	175,562
Cost per child registered	0.66	0.24	0.06
Cost per child-visit	0.09	0.03	0.012

* The costs of growth charts are not included, as full costs were paid for by the mothers.

The costs of the Boga programme were considerably higher than the other two programmes, although if a motorcycle was to be substituted for the Land-Rover, costs could be reduced by about 40% to about £0.40 per child under five and £0.05 per child-visit. The Katana programme covered over half of its costs by charging all mothers a fee of Z10 (£0.13) once a year. This programme also had smaller costs for transport than Kasongo and Boga, as roads were in better condition and average distances to health centres were less than half those in Kasongo. The Katana project estimated a cost of Z20 per kilometre for the four-wheel vehicles, while Kasongo estimated a cost of Z45 and Boga Z33 per kilometre. These figures included fuel, maintenance, repair and replacement of the vehicle after six years, and in Kasongo and Katana the salary cost of the driver as well.

The Kasongo Project Team (1984) estimated that the cost of fully immunizing a child was US$ 0.80, or £0.60, for full coverage in 1984. If inflation brought the cost to £0.70 per child in 1986, the cost per year spread over the five years that a child was in the child health programme would be £0.14. Even if immunization is included, the costs of the child health sessions still appear reasonable, between £0.20 and £0.80 per child, comparable to the programmes reported from Indonesia and India, which also included drugs (see Chapter 2).

CHAPTER 6

DISCUSSION OF OBSERVATIONS OF CHILD HEALTH SESSIONS

The observations of the child health sessions were used to analyze two main questions:

1) Did the health workers accurately identify at-risk children?

2) Did they provide appropriate interventions on the basis of the diagnostic information available to them?

6.1 Weighing and Recording Technique

The identification of at-risk children through detecting unsatisfactory weight gain requires the accurate measurement and recording of weights as a first step. In general this was done well in all three programmes. Minor faults, such as the hanging scales being too far above eye-level for accurate reading, were observed on only two occasions.

Workers sometimes did not let the needle become steady before reading the weight as is recommended (*Morley and Woodland* 1979). Crying and struggling children were not likely to calm down while suspended from the scale and so the weighers had to read the weight with the needle swinging. There was a difference in the amount of crying at different sessions, and it was the author's impression that an important factor was the way in which the weighing was done. Some techniques which appeared to reduce struggling and crying were: suspending children at a height not too far from the ground, preventing mothers and children from crowding around the child being weighed, having numerous sets of weighing pants so that mothers did not have to hurry the children into the pants and on to the scale, and having the mother rather than another person suspend the child from the scale. In addition, if the weighers kept their movements quiet and unrushed, this was less likely to frighten an apprehensive child. Reducing the number of struggling children and the noise from crying would also help to reduce the fatigue of workers.

Recording the weight correctly is a more complex task than reading the scale, yet even here mistakes were few. Errors seemed to be due more to the pressure and pace of work than the workers' inability to understand the graph on the chart. When errors were brought to their attention, they quickly grasped, for example, the significance of not having left blank spaces for the months that a child did not attend. The educational level of workers doing the weighing and recording ranged from five years for a few VHWs to 10 years for some auxiliary staff. This lends support to the experience of programme managers who say that incremental training followed by supervised on-the-job experience is at least as important as level of schooling in the competency of workers (*Gopaldas* 1988).

6.2 Making a Diagnosis

In addition to accurate weighing and recording technique, evaluation of a child's health status requires accurate interpretation of the weight trend and supplementary information obtained by questioning the mother and examining the child. These procedures were less well done than weighing and recording. Twenty-one percent of children observed who had gained insufficient weight were not subjected to any further diagnostic procedures. The reasons for this were not clear and interviews with health workers after the sessions shed only partial light on them. Some of the children were missed because the health workers did not recognize inadequate weight gain as opposed to absolute weight loss, but even 15% of children with weight loss were not given any further diagnostic procedures. It is likely that the large numbers of children who had to be seen in the short time-period of a session caused workers to unintentionally miss some children with weight loss, or to "ignore" them intentionally, if for example, the child had an adequate weight-for-age and seemed in generally good health.

One study in Indonesia found that workers incorrectly classified 40% of children who had not gained weight as gaining, and 20% of children who had gained weight as not gaining (*Directorate of Nutrition, Indonesia,* 1985). Gopalan and Chatterjee (1985) claim that workers have special difficulty in identifying inadequate weight gain and that the idea of parallelism to the reference line is not easily grasped, especially by less qualified workers. They quoted a study which found that 35% of children with insufficient weight gain for three months or more had not received any interventions. The Medical Director of Katana agreed with this to the extent of not teaching workers to follow the reference line but to memorize specific monthly weight gain targets for different age-groups (*Malengreau* 1988). In this study, children with weight loss did not receive significantly more diagnostic procedures than children with inadequate weight gain. Information obtained from workers about the management of children with prolonged growth faltering also supported the idea that they did not recognize insufficient weight gain nor fully understand the importance of a weight deficit accumulated through numerous episodes of inadequate gain.

Although the health workers claimed on interview that weight velocity was a more important clue to the child's health status than attained weight, the understanding of of its usefulness appeared to be weak. Some staff in Kasongo used the weight on the mother's record to proceed with the consultation, only plotting the weight on the graph at the end. In Katana, the staff had been instructed to write the weight in kilograms below the date on the chart, in order to allow the supervisors to check whether the weight had been plotted correctly. Staff frequently used the weight in kilograms to decide on their intervention and only plotted the figure on the graph afterwards. Thus, the precise information afforded by the graph about the velocity and time-period of weight gain or loss was not used consistently.

In making a diagnosis, health workers asked questions and examined the child as well as using weight information. The importance of asking questions about illness even if the child's weight had risen was shown by the fact that 35% of children who had gained weight were identifed as being ill at the time of the session. Conversely, the importance of asking questions regarding weight loss for reasons other than obvious recent or current illness was shown by the fact that 43% of children had inadequate weight gain but were not diagnosed as having a current or recent illness (Table 5.4). However, the number and complexity of the questions needed to establish the reasons for growth faltering in the absence of obvious illness would be difficult to teach lower-level health workers and to carry out in a time-pressured session (*Nabarro and Chinnock* 1988). The workers confined themselves to two responses to insufficient weight gain which was not accompanied by obvious illness: referral to the health centre, or a question about the child's appetite. Only in Boga did health workers frequently ask about the appetite of children who had not gained weight. In the other two programmes, a higher proportion of children with adequate weight gain than with growth faltering were asked whether the child had been eating well. This question may simply have been a conversational opening when staff saw that the child had gained weight and the mother did not spontaneously mention an illness.

More children were given a diagnostic procedure and more at-risk children were given interventions in Katana than in the other two programmes. Here the workers had been instructed to ask specific questions about illness and to examine the eyes and spleen of the child. They also had to write this information in specific spaces on the growth chart. In

Kasongo, the algorithms meant to guide workers through the diagnostic and intervention process were not used because they were too complex to follow. In Boga there were no explicit instructions. It appeared that the diagnostic process was improved by clear instruction on procedures to follow and consistent charting of information.

6.3 The Interventions Provided

The interventions available at the same time and place as weighing were determined both by practical and theoretical considerations. In Kasongo, the managers' interest in emphasizing the importance and accessibility of preventive activities meant that as many as possible were provided together: antenatal care was provided at all child health sessions and immunizations were also provided at mobile sessions. On the other hand, treatment for illness, the cause of much growth faltering, was only available at the health centre at a different time from the child health session in the Kasongo and Katana systems. The difficulties of referral in these programmes were somewhat reduced by the payment systems, but other costs such as the time and transportation still had to be borne by mothers and probably considerably reduced the number who complied. The Boga programme offered immunizations and treatment for common illnesses during sessions (although few medicines were prescribed in the sessions observed), while in Katana immunizations only were provided.

The more services offered at child health sessions, the more effective the programme is likely to be because of more frequent and regular attendance, and immediate treatment of illness (*Murthy* 1984, *Bhan and Ghosh* 1986). One study in Indonesia registered a significant increase in attendance when immunizations and other maternal and child services were made available at the same time and place as weighing (*Hill et al* 1983). The inclusion of other services in the programmes observed would require a reduction in the number of children per worker to be seen at each session or a re-organization of the roles of staff and mothers, otherwise the sessions would last too long. Ways to achieve this are discussed below in Section 6.6.

The interventions in the three programmes were limited to what the health service could do for people. Aside from obtaining the help of the community to build shelters from the sun, they had not investigated thoroughly the interest of the community in knowing about and acting on the problems of child health and nutrition, except in two instances in the Kasongo zone. A small "nutrition study group" in one village had discussed the reasons for malnutrition and concluded that a major constraint to improvement of child health was the over-work of women. As a result, they were planning schemes to introduce food-processing mills and to protect water sources in the village. The group of "wise mothers" mentioned in Section 4.4 had been active in detecting measles in their neighbourhoods and disseminating health information to mothers.

In general, the child health programmes were isolated from other development activities going on in their areas, as has been noted in the Tanzanian and other programmes (*Payne et al* 1986). Some converging of activities occurred almost coincidentally, as for example teaching mothers in sessions about hygiene while having a separate programme for water protection. However, the child health programmes did not make use of the information and services available in the agricultural programmes, as far as could be determined.

6.4 The Process of Consultation

A consultation should logically start by informing the mother of the trend of the child's growth. This was done for only about half of at-risk children, but as mentioned, most mothers were informed at the point of weighing what the child's weight was. Another practice which is recommended is to show the mother the child's weight line on the chart, pointing out the difference between it and the reference curve (*Morley and Woodland* 1979). This is supposed to help the mother perceive the risk to her child and visualize the possibility of effective action, as well as to give her positive feedback when the child has resumed gaining weight, all of which help to make health education more effective (*Iseley* 1982, *Rohde* 1985). Showing the line to the mother was done to about half of at-risk children in Boga, and very infrequently in the other programmes.

The workers said they believed that mothers could not learn to understand the charts because they were illiterate, but when challenged about this, admitted that even illiterate people could distinguish between lines which were rising, falling or relatively horizontal. Pinto (1984) and Rohde (1985) claim that the effort expended by the programme in teaching mothers to interpret the weight line is a more important factor in the ability to understand charts than literacy. The ability of women to understand the weight charts in spite of illiteracy was shown by the survey results from Boga where 76% of women with no schooling correctly interpreted their child's chart, in a programme which made no consistent efforts to teach this (page 178). Few training programmes have emphasized the use of charts as a means to educate mothers (*Lalitha and Standley* 1988).

A criticism which has been made about growth monitoring is that workers frequently fail to recognize and treat infections (*Gopalan and Chatterjee* 1985). There was no means in this study for determining whether all infections were accurately identified. However, all three health services had a back-up system for the child health programme and there was no shortage of drugs; the main barrier to adequate treatment of infection was the distance, time and cost of referral. Staff did not systematically follow-up children who had been referred to see if they had complied, or to check on their progress. Illness was dealt with mainly by counselling and referral. Some referrals were no doubt mainly a result of time pressures. This was most clearly the pattern in Kasongo where the amount of counselling given on illness and feeding was overshadowed by referrals. It is probable that more illness could have been adequately cared for at the sessions, even without dispensing medicine, if health workers had had more time, and had been instructed to counsel mothers.

The importance of emphasizing feeding during and after illness has been shown in a number of studies of the effect of illness on appetite and growth. Studies in The Gambia showed that children failed to catch up to previous weight-for-height after diarrhoeal illness if the infection occurred in the first year of life. If children were given sufficient food, they could reach many times the overall mean normal rate of growth (*Rowland et al* 1977). Van Lerberghe (1987) showed that weight deficits acquired in the first year of life accounted for 45-90% of the total weight-for-age deficit shown by the age of five years among children in Kasongo. These studies point to the importance of extra feeding to promote catch-up growth, especially in the first year of life. However in the child health sessions and curative care session observed, health workers put their more of their efforts on managing the acute stage of the child's illness and not on the regaining of weight in the post-acute stage.

Staff frequently told the mother to make special efforts to feed the child well; much less often did they cite specific foods to give or mention increased frequency of feeding. They said it was not possible for many mothers to feed their children more than twice a day. The main constraints had more to do with the mother's position in society and her work-load than with availability of food, in Boga and

Kasongo at least. Most mothers worked in their fields a significant portion of the day, or were at the market, and frequently left small children in the care of other children or grand-parents. Even if they left food for the youngest child, older children would be likely to take a share of it. Men in this society were not expected to prepare food, and many interviewed said they could only cook a mid-day porridge for the child "in secret", out of sight of the neighbours, or risk being ridiculed. A mother might take time out from field work for a few days during the acute stage of the child's illness, but could not afford to do so when the child seemed to have recovered, even if the nurses did explain the need for extra feeds for several days after the acute illness. As well, mothers and guardians may not have felt able to put in the considerable effort needed to persuade an anorexic child to eat.

Advice for regaining lost weight needs an imaginative approach beyond the standardized directives which the workers used in these programmes, an approach which should be worked out with the mothers (*Rohde* 1985). The constraints faced by mothers underline the fact that individual counselling could only be partially effective in resolving this and other child feeding problems; other approaches at the family and community level would also be needed.

All advice given was directive, with little attempt to solicit the mother's reaction to it, to find out if she understood the advice and could follow it, to work out alternatives if not, and to persuade her of the importance of following it. The advice was also very standardized. One mother was heard leaving a consultation muttering in an exasperated voice "Sombe, sombe, sombe, sombe..." (cassava leaves), indicating that she had heard this piece of advice many times before. Similar faults in health education have been identified many times in the literature (*Ritchie* 1979, *Alnwick* 1985). The problem was probably due to a combination of a lack of nutrition knowledge on the part of the workers and few skills in techniques of adult education, added to time pressures (*University of California* 1975, *Alnwick* 1985, *Griffiths* 1986). The physicians in Kasongo had begun to put substantial efforts during their supervisory visits into teaching the nurses techniques of adult education, emphasizing skills of dialogue and problem-posing as described by Freire (*Drummond* 1975, *Melotte* 1987). Griffiths (1988) claims that effective counselling can consist of a standardized prescription for action, as long as the audience has had substantial input in the formulation of the message.

In a large session with many children to be seen, an interactive process with each mother would take a good deal of time, and extend the session by hours. It may be more feasible to use a group approach as was seen in two sessions in Boga. The clinic helper sent the mothers of children with more than one month's growth faltering to take part in a group discussion. The VHW holding the discussion was an older woman who had competently raised a large family by herself and had been an active VHW for several years. She talked with the small group of women for 20 minutes, asking the mothers their problems, offering ideas and trying to stimulate a discussion. This use of dialogue and peer group support and pressure can be more effective than individual counselling, according to some authors (*Mukarji* 1985).

The physician in charge of paediatric services at Kasongo articulated a feeling which may be at the root of some workers' seeming passivity in the face of growth faltering and malnutrition. This physician was carrying out research into the effectiveness of hospital interventions on malnutrition. Preliminary results appeared to confirm the hypothesis that malnutrition which was caused by infections could be reversed by treating the illness and perhaps urging the parents to give more intensive feeding for a limited time-period. In contrast, malnutrition which was chronic and which had long-term, social causes such as very poor or neglectful parents, was felt to be beyond the scope and capability of the health service to deal with effectively (*Melotte* 1987). The Medical Director of Katana held that as most malnutrition in the area was mainly due to poverty, the answers were to be found in agricultural and economic improvements rather than health education (*Malengreau* 1987). If these beliefs were echoed by a lack of emphasis on health education during training and supervision of health workers, they would be less interested in and capable of carrying out health education to promote growth and nutrition.

What help can a health worker realistically give to a mother in the space of a one to three-minute consultation?

Although the staff did spend slightly more time with mothers of at-risk children than mothers of well children, as long as the consultations are so brief, it is difficult to see how their content can be markedly improved. This pattern of brief, standardized consultations has been decried in many child health programmes (*Reid* 1984, *Alnwick* 1985). Even if staff are taught better techniques of interactive health education, in order to use these techniques the sessions would require a re-organization of activities and larger roles for non-professional staff, and especially for the mothers. Otherwise, the effects of the programmes will be limited to those shown in this study: the identification of growth faltering in a selected segment of the children, the effective treatment of a certain proportion of the children who attend, and a limited amount of learning and behavioural change in mothers.

6.5 Organizational Issues

The fact that the programmes were health-service controlled and run has numerous implications for improvement of the coverage and quality of the activities. Although there was much to be commended in the programmes, several features in the organization of the sessions were dysfunctional. The more important aspects are discussed below.

6.5.1 *Mother or clinic-retained growth charts*

First, the two programmes which kept the growth charts at the clinic had to use one staff-person for most of each session simply to find and re-file charts. The Boga programme had no problems with women forgetting or losing charts. During the Boga sessions, a record was kept of children attending. It was a simple matter at the end of the session to determine the total numbers attending as well as the individual children who had not come. This record-keeping took no more time than the other programmes took to fill in the mothers' records and was easier to use for compiling statistics at the end of the session. It had the potential of being adapted to provide the more detailed information on weight performance of children that could be obtained from the clinic-retained charts.

6.5.2 *Waiting time and sequence of activities*

Secondly, most activities in sessions were carried out in a sequence and were offered on a first-come, first-served basis. Women spent much time waiting, in and out of queues, for weighing, for finding their chart, for the consultation, and for immunization. In one health centre, they queued a fifth time to have the immunizations recorded. In Kasongo and Katana immunizations were given at the end of the session, so that women who had come early had to wait to the end of the day to receive them. Under this system, mothers of well children could wait for hours for a consultation with a health worker, only to be told simply that the child was well. Minimizing waiting time is said to encourage good attendance (*Morley* 1963). The time of mothers is often at a premium, especially for those in waged or daily paid jobs or with numerous agricultural and domestic tasks. However, several health workers and members of health committees mentioned that most rural mothers are not worried by waiting since they have their husband's permission to take a day off from field work to attend the sessions and enjoy the chance to socialize, a view supported by Rohde (1985).

This way of organizing activities had another effect which was elicited from the health workers interviewed. They acknowledged that the work was repetitive and tiring, citing the large numbers of children to be seen and the pressure to work quickly. However part of the problem also lay in the assembly-line nature of the activities as they were organized, which probably increased boredom and fatigue. Workers received children "piece-meal", for one task at a time, rather than following them through from weighing to counselling, treatment and immunization. In Boga, women received counselling and immunizations, and sometimes medical treatment as well, in one encounter with one health worker. However, it was probably slower to give immunizations in this fashion, and such a procedure might not be practical for dealing with the large numbers of children in the other two programmes unless other changes were made in the organization of sessions.

6.5.3 *Roles of staff*

Another dysfunctional aspect of the sessions was that staff were not always fully or appropriately employed. Mothers and children waiting for consultation went to the first staff person who was free. In this way, the children with the most difficult problems might be seen by any of the workers rather than, as would be ideal, by the best-qualified staff person, usually the nurse. In most sessions, the nurse who was in charge of the session spent all his time doing consultations rather than taking some time to observe and teach the lesser-qualified staff. Staff who were assigned to dispense medicines or give immunizations often had long periods of inactivity. In Boga, once the VHWs had finished doing the weighing and the health talk, they did not participate in the consultations and add their knowledge of the families' circumstances to the advice offered, nor did they watch or listen to the supervisor in order to learn ideas useful for their work, especially for home visits.

6.5.4 *The health worker-to-child ratio*

Applying a triage procedure was tried in one programme which resulted in a decrease of 40% in the numbers of children who were seen for a consultation by the nurse. The triage was done at the point of weighing by a skilled auxiliary: the child's weight trend, immunization status, and eyes and spleen were checked, and the mother was asked if there were any problems. Using this information, the auxiliary then sent the mother for immunization and/or for a consultation, or told her she could go home as the child appeared well (*Malengreau* 1988). This also had the advantage of channelling the sick children to the best qualified person at the session, usually the nurse, so reducing the fatigue of the nurse and probably improving the care given (*Teller* *et al* 1985). One nurse in Kasongo had instituted his own triage system: the clinic aide scanned the waiting mothers and children and selected those who looked sick or thin to see the nurse first, while he was still fresh and not fatigued. Although the children had been weighed by the clerk, this information was not used to select the children who would have consultations before the other children. The clinic aide and nurse relied simply on visual signs.

Since two-thirds of children in the observed sessions were classified as at-risk, even good triage which used the same criteria to select at-risk children would not substantially reduce the numbers who required at least a minimal consultation. Other ways of reducing the volume of work (and hopefully increasing the quality by providing more time for the sick children) would be needed. Gopalan and Chatterjee (1985) recommend that children be screened in the home by arm circumference and only those at risk need be weighed. At-risk children could also be identified by socio-economic criteria and health workers could spend more time with them in home visits (*Teller et al* 1985). Considering that morbidity and mortality falls sharply in children over 36 months, and that growth faltering is most amenable to treatment in younger children, terminating growth monitoring at the age of 36 months would appear to be a reasonable option (*Chen et al* 1980, *Pswarayi et al* 1987). Children known to the health staff to have serious health problems could be kept on in the programme. If children 36 months and over were eliminated from the sessions observed, the numbers would have been reduced by 18% in Boga, 15% in Kasongo and 25% in Katana.

Another method to reduce numbers that had been tried in Katana was to select children 36 months or over who had gained adequate weight since the previous session and give them a "holiday" of two months ie. weigh them every three months. Staff forgot to accord the holiday in 26 of 32 or 81% of children meeting these criteria in the sessions observed. There was no standardized policy on terminating or reducing the frequency of monitoring for children 36 months or older in Kasongo. Most health centres continued to include children up to five years. In those which gave holidays from weighing, it was a mark of pride among mothers to be accorded this.

Reducing the number of children per session could also be achieved by having more frequent and smaller sessions. A few health centres in Katana had one very large growth-monitoring session per week, with over 100 children attending. Some authors recommend no more than 50 children per weighing post (*Johnson* 1984). A qualitative assessment of the sessions in Katana and Kasongo showed that those which had fewer children per worker appeared to produce better results. The health talk was more leisurely, allowing for some dialogue with mothers or another activity, such as singing. Consultations were less hurried and the staff were more thorough with questions and physical examinations. They missed fewer children with problems, and made fewer recording errors.

In spite of the fact that the sessions in Katana were larger than in the other programmes, health workers in this programme intervened more comprehensively in a higher percentage of the at-risk children, indicating that simply reducing the size of the sessions would not automatically increase the time and quality of care given to children. Nevertheless, reducing the total numbers of children to be seen per worker would make conditions more conducive to this end. It would facilitate interactions between the mothers and at least reduce the noise levels, the workers' fatigue and the pressure to finish work and allow everyone to leave.

If the current system of child health sessions was continued, and if mothers and communities were not given a major role, to have more sessions in Kasongo and Katana would mean putting auxiliary workers in charge of at least some of the sessions and hiring and training more staff solely to do growth-monitoring. This would allow the nurse to continue to carry out his other duties, which none of the other health workers were qualified to do. It would have implications for the financing of the programme, since the payments from new registrants just cover the salary-costs of staff. In Boga, some excess capacity existed, in terms of numbers and work-load of nurses, and smaller but more frequent sessions could have been accommodated. Alternatively, or in addition, activities could be re-organized in order to give larger roles to mothers, communities and less-qualified workers, so as to free the time of nurses for other activities. This would involve a fundamental shift in the orientation of the programmes from a strategy of screening children for health interventions to a strategy aimed primarily at education and participation of the community. Whether communities would be receptive to such an approach is not known.

6.5.5 *Supervision*

To what extent the quality of the programmes could be attributed to adequate supervision cannot be known exactly, but it is certain that supervision is a fundamental element in good service delivery (*Simmons et al* 1986). There was a marked difference in the programme managers' interest in and attitude towards the child health sessions which appeared to be reflected in the quality of the work performed. The Medical Director of Katana was a paediatrician and had long been concerned with the functioning of the child health programme, including the various programmes in the area to reduce malnutrition. Sustained attention was paid to the child health programme by the nurse-supervisor and the Medical Director, reflected in well-organized training activities for auxiliary staff who worked at the sessions, the availability of written guidelines, the positive reactions to the analysis and report by the nurse-supervisor on the programme, and the efforts put into the nutrition rehabilitation programme.

In the Kasongo programme, less attention was paid to supervising the child health sessions per se, although other efforts to increase staff competencies, such as the involvement of communities in the administration of health centres, and the decision to train nurses in adult education techniques, could be expected to have a beneficial effect on the child health programme. However, auxiliary staff involved in screening, counselling and running the health centre nutrition programmes had received little training and supervision. Some doctors had supervised child health sessions mainly to emphasize to the nurses the importance of this activity, but they had made few observations or suggestions for improvement.

In the Boga programme, the two supervisors who ran the sessions had themselves received little ongoing supervision. They did not understand their roles in the training and supervision of student nurses, and had minimal skills in health education.

6.5.6 *The role of the community*

All three programmes trained local people as auxiliary workers to work in the child health sessions, recognizing that the extent of their integration within the village society and culture could enhance the credibility of the programme in the eyes of the mothers (*Melotte* 1987, *Nickson* 1987). Otherwise, the involvement of the community took the form of collaboration and cooperation with the health service, providing buildings for use during the sessions and occasional "ad hoc" assistance, for example, fetching vaccines from a depot with a community member's motorcycle. Some health centre or village development committees had also helped by disseminating information about the services and encouraging parents to bring their children. Mothers, the major actors in child health, had not been actively consulted but merely expected to be passive recipients of services. The use of growth monitoring as a tool for education and motivation of the mothers and community was subservient to its use as a screening tool for the health service.

Some programmes documented in the literature have been able to use growth monitoring to involve community groups in an increasing number of activities, both at weighing sessions and in other health-promoting activities. Most of the successful programmes appear to be run by NGO's with special characteristics not always found in government programmes. It must also be noted that some successful NGO's have not found growth monitoring to be useful in the community development process (*Mukarji* 1985, *Arole* 1988, *Chauduri* 1988). The government programmes which attempted a more participatory approach found that most villages provided a varying quality of screening and counselling services, and only occasionally have the growth monitoring activities proved to be an incentive to initiate other activities such as schemes for feeding malnourished children (*Hill et al* 1983, *Payne et al* 1986, *Grant* 1987). It is not known whether the programmes in Kasongo and Katana had ever tried to use growth monitoring as a stimulus to community action. The Boga progamme had not.

6.6 The Rationale for Weighing

Weighing was used by these programmes primarily as a screening device: lack of weight gain combined with other diagnostic information identified the children on whom interventions should be focussed. Growth faltering was observed in 44% of children at the sessions, and a further 20% were identied as being ill, resulting in a total of 64% who were classified as being at-risk (Table 5.5). Thus the screening mechanisms could not be said to greatly increase the efficiency of the sessions, as only about one-third of children were screened out. However, even those children not needing an intervention at that session were likely to experience an episode of illness or growth faltering in the near future, as most children attending were under three years of age and appeared to experience the pattern of frequent morbidity usual to this age-group in developing countries (*Pswarayi et al* 1987, *Van Lerberghe* 1987).

Gopalan and Chatterjee (1985) point out that individual screening is not carried out when anaemia and Vitamin A deficiency are known to be widespread: iron and Vitamin A are given to all children without laborious diagnostic procedures. This principle applied to growth monitoring would imply that individual weighing was unnecessary for children under three years of age in most areas. An alternative would be to screen by age, in effect treating all children under three as at-risk of infection and growth faltering. Their mothers would be counselled as a group, or as a mixture of sub-groups, such as mothers whose children had diarrhoea, or respiratory infections, or whose children were starting to be weaned.

Taking into account the low knowledge level of many of the workers, it is not certain that the advice given to mothers as a group would be better than the advice given to mothers as individuals. However, it might conceivably improve the health education simply because there would be adequate time to give a full explanation or have a discussion on a subject once per session with a group, instead of repeating brief, generalized comments to each mother. Some successful NGO programmes have chosen not to weigh children because they found that mothers were not interested or because the weighing detracted from the time and energy needed to concentrate on the essential element in the programme's effectiveness, the health education activities (*Mukarji* 1985, *Chauduri* 1988).

A second use of weighing was to screen children for illness. However, in these sessions the great majority of illness was identified through the mothers' statements rather than by the health workers' detection of illness through growth faltering. About one-third of children who were classified as currently ill had not experienced growth faltering, and for those children who had experienced growth faltering, the mother frequently stated spontaneously that the child had been ill. In fact, health workers in Boga and Kasongo said that mothers "defended" themselves for a child's loss of weight by claiming that it had been ill, rather than accept "blame" for not feeding it properly.

Weighing may have helped the worker to identify some illness not recognized by the mother, but this would have been true of only a small number, according to nurses interviewed in Katana. Questioning and physical examination would still elicit the majority of illness. However, workers thought that weighing did help them to see whether a child had recovered from an illness sufficiently to start re-gaining weight, or required further treatment.

The fact that over one-third of children attending were identified as being currently ill suggests that mothers were prompted to go to the session in order to obtain information about the illness of their child. Mothers could also receive information about the child's weight and state of health, advice about an illness, and if necessary, a referral, at no cost.

The third use of weighing in Kasongo and Katana was to screen children for referral to the nutrition rehabilitation programme. Overall, four per cent of children were referred. The utility of this process is questionable, mainly because of the questionable effectiveness of nutrition rehabilitation programmes in general (*Brown and Brown* 1979, *Beaton and Ghassemi* 1982). The nutrition programme run at the health centres in Kasongo was not considered effective by the physicians and the programme in Katana was said to vary in quality between health centres. Information on the effectiveness of the hospital nutrition rehabilitation programmes in Kasongo and Katana was not available.

Some use was made of weight information in Katana to select children for home visits by health workers, but this was done infrequently. In Boga, some VHWs made home visits to children who were identified by weight information as malnourished, but most said on interview that they knew the families in their village which had children in difficulties, identifying them by social and economic criteria. The effectiveness of the home visits would anyway be uncertain due to the very basic level of the VHWs' training in nutrition.

Information from weighing can also be used for monitoring and evaluating programmes, although Payne (1985a) and Nabarro and Chinnock (1988) caution that malnutrition has many causes and solutions besides the activities of the health service. No use was made in these programmes of weight information for assessment of levels of malnutrition in the population or for evaluation of the programme, aside from estimating coverage. Aggregate weight information was not used by the health workers as a tool to teach and motivate mothers and communities about the health and nutrition of children, as has been done in Indonesia and Tanzania (*Hill et al* 1983, *Payne et al* 1986).

The impact of a screening programme depends not just on the effectiveness of the interventions provided, but on the frequency and regularity of screening of the at-risk group. In the three programmes observed, the frequency of attendance of children under three years of age may have been adequate in Boga and Katana for early detection of problems in those who were registered in the programme. The attendance targets in the Kasongo programme were for children under 12 months of age to attend five times for immunizations, every month for children between 12 and 23 months, and every three months for those between 24 and 35 months. These targets were not reached in some of the rural health centres. The targets for children under 12 months of age may be considered rather low, in view of the fact that growth faltering was well-established by five months of age in Kasongo and the growth deficit acquired by one year accounted for much of the total growth deficit by five years (*Van Lerberghe* 1987). Attending every three months is less than recommended by most programmes, but the expected monthly weight gain for children over two years is about 200 gm, close to the limits of accuracy of weight measurement and recording. The very small growth charts used in this programme meant that a point marking the weight could easily cover one-third of the space denoting one kilogram, or 300 gm. It could not be determined from the data available in Kasongo and Katana whether lower-risk children attended more frequently than higher-risk children, but the survey in Boga showed higher attendance levels in children of better-educated and economically better-off mothers (Figure 7.1). Thus children whose personal circumstances meant that they were more likely to be ill and malnourished were less likely to receive health care than healthier children living in more favourable circumstances.

Although weighing could not be considered as an efficient screening device in these programmes, ceasing to weigh children might have effects other than that of saving health staff time. A substantial number of mothers were heard by the author to say "that's an increase" or "s/he's lost" when the weigher told them the child's weight. The group of "wise mothers" in Kasongo said forcefully to the author that mothers would not come to the sessions "just to hear the nurse talk". They said that mothers and their husbands liked to know the weight of the child. This was supported by the results of a survey of 3590 mothers in nine health zones in and near Kinshasa. It found that 64% of mothers named weighing and vaccinations as the main reasons for attending child health sessions. In five of the nine zones, weighing was named as the prime factor over vaccinations. However, unlike the comments made by the "wise mothers" about health education, the third most important reason for attendance was learning new information, mentioned by 52% of mothers (*Ceplanut* 1986). No information was given in the report on the programmes and the type of health education which was carried out in them.

Such information supports the argument that knowing the weight is a motivating force for mothers to attend sessions and to follow advice (*Ashworth and Feachem* 1986, *Arole* 1988). Once mothers have become used to knowing their child's weight, they might regard stopping weighing as a decrease in individualized service. This could have several outcomes, ranging from a decrease in the frequency of attendance to a decision by mothers to weigh the children themselves.

CHAPTER 7
SURVEY RESULTS

7.1 General Characteristics of the Sample Population

The data in Table A3 show that nearly two-thirds of the households in the area were dependent on subsistence agriculture for their livelihood. One tribe, the Wahema, was traditionally a cattle-raising tribe, although only 89 of 270 Wahema households, or 33%, owned any cattle, and only 43 of these owned over 30 head of cattle. A sociological study of the area (*Bureau du projet Ituri* 1986) considered that an average family of six individuals required a minimum of 30 head of cattle to sustain them if they did no farming. Almost all women stated that their occupation was farming. Most women did not have the basic education required for salaried jobs: 42% had no education and only 27% had more than four years of schooling. Males were clearly favoured in access to education; the difference between the sexes was greatest at the two extremes, with 15% of men versus 42% of women having no education, and 28% of men versus eight per cent of women having some secondary level education.

Twenty per cent of the sample households had one child, 39% had two or three children, 27% had four or five, and 14% had six or more. The proportion of the sample households' population who were children was not representative of the local population as a whole, since households which had no children under five years of age were not included in the sample.

Overall the scores for the households' socio-economic levels ranged from two to nineteen, the maximum possible. About half of the households received a score of six to nine points, a small spread which indicated the relative homogeneity of the apparent wealth of the population. It did not reflect the differences which may have existed, because of access to sources of income which were unknown to the author. For example, a village chief often lived in a house which looked the same as most other houses, but his position of authority gave him access to certain benefits such as the ability to issue permits for a small fee, or to receive gifts or buy goods at a favourable price.

The use of modern health services by women and children was widespread. Only 11% of mothers said their last child had been born at home, and 89% were able to name the facility that they said their last child had been born in (Table A4). It was a matter of embarrassment for some women not to have delivered in a health facility, and this may have led to a slight exaggeration of reported use. A vigorous effort has been made to encourage women to have supervised deliveries for many years. Before independence in 1960, women were even fined for non-compliance with this policy.

Ninety-four per cent of mothers claimed to have been to a weighing clinic at least once, but 14% of these said they had lost the growth chart or were unable to open a locked cupboard where it was said to be kept. Only the 442 mothers (81% of the sample) who were able to show the interviewer a chart for the index child were classified as having a chart.

The proportion of index children who had a growth chart varied between villages from 45% to 96%. At least 75% of the index children had a growth chart in 12 of the 17 villages sampled.

One element that may be important in motivating mothers to attend child health clinics is their partner's permission and the interest he shows in the child's weight performance. Sixty-six per cent of mothers reported that their partner looked at the chart, and 14% said that he asked about the child's weight status, giving a total of 80% of the 378 respondents whose partners were reported to show interest in the child's weight.

The mothers were asked to estimate the distance in time and/or kilometres from their home to the venue of the nearest child health session. Although many had difficulty in answering this question, their responses indicated that the sessions were held reasonably close to most of their houses. Only 18% of the 375 respondents who answered this question in terms of kilometres said they walked three km or more, and 25% of the 441 respondents who answered in terms of time said they spent an hour or more to walk from their homes.

The immunization coverage of the index children was high, since immunizations were given at every session and most had attended the child health clinics frequently during the first year of life (Table A4). Ninety-one per cent of the 134 index children aged 12 to 23 months inclusive who had a growth chart were fully immunized. Since 81% of eligible households had growth charts, it was estimated that 74% of all children aged 12 to 23 months in the population would have been fully immunized.

7.2 Interrelationships between Mothers' Descriptive Variables

The interrelationships between attendance, mother's education, socio-economic level, parity and tribe are shown in Table A9. Attendance was significantly associated with a higher level of maternal education and socio-economic status, and was highest in the Wahema tribe and lowest in the "Other" tribe. There was no significant association between attendance and parity.

Educational level was significantly associated with socio-economic level and was highest in the Wahema and lowest in the "Other" tribe. No clear trend was evident between educational level and parity. The highest socio-economic level and parity were found in the Wahema, and the lowest in the "Other" tribe. Higher parity was significantly associated with a higher socio-economic level.

In summary, the Wahema tribe tended to have higher levels of attendance, education and socio-economic status, and to have larger numbers of children. The "Other" tribe, many of whom were refugees from Uganda or immigrants from other areas in Zaire, had the lowest levels for all these variables and the Wangiti were in-between. All of the variables were significantly associated with each other, except for educational level with parity, and attendance with parity.

7.3 Mothers' Understanding of Growth and the Growth Chart

7.3.1 *Ways in which mothers assessed growth*

Mothers reported several ways of assessing whether children were growing well, as shown in Table 7.1. Most relied on the child's appetite, mentioned by 71% of mothers, or lack of illness, mentioned by 55% of mothers. Weight gain was the third most common criterion, reported by 33%. Only five per cent of mothers mentioned that they assessed growth by using the weight chart, although 61% of the mothers who had a chart knew that one of its purposes was to record the child's weight (Table 7.2). This question about the purpose of the chart was asked before the interviewer enquired whether the mother had a growth chart for any children under five, so as not to prompt her to mention it. The ways of assessing children's growth and the purpose of the growth chart were not discussed in child health sessions by the health workers.

Table 7.1
WAYS IN WHICH MOTHERS ASSESSED THEIR CHILD'S GROWTH*

Ways of assessing growth	*No. of Mothers*	*%*
Eats well	386	71
Is not sick	299	55
Weight gain	182	33
Change in body size	123	22
Plays well	90	16
From growth chart	30	5
Good humour	29	5
Intellectual development	14	3
Other	52	10
No answer	11	2
Number of respondents	536	

* Up to five answers were recorded for each mother

7.3.2 *Knowledge of the purposes of the growth chart*

Mothers were asked what were the purposes of the chart. Table 7.2 shows that the most common answer was to record the child's weight, mentioned by 55% of respondents. The next most common answers were to record immunizations and to know the child's health, each mentioned by 33% of respondents. Only six per cent of the mothers who had a chart had no idea of its purpose, and 47% of mothers without a chart could state at least one purpose for it.

Table 7.2
Understanding of the Purpose of the Growth Chart*

Purpose	*Mothers with chart*		*Mothers without chart*		*Total*	
	No.	*%*	*No.*	*%*	*No.*	*%*
Record child's weight	268	61	33	31	301	55
Record immunizations	154	35	24	23	178	33
Know the child's health	152	34	29	28	181	33
Other	3	1	3	3	6	1
Don't know	28	6	56	53	84	15
Number of respondents	442		105		547	

* Up to three answers were recorded for each mother

Table 7.3 shows that 37% of mothers were able to state two or more purposes for the growth chart; this ability was significantly associated with attendance, number of weighings, education, parity and tribe. Higher attendance was still significantly associated with the ability to state two or more purposes for the chart after controlling for parity, the most strongly associated variable (X^2_{MH}=51.7, 1 d.f., p<0.001).

Table 7.3
ASSOCIATIONS BETWEEN MOTHERS' CHARACTERISTICS AND KNOWLEDGE ABOUT GROWTH CHARTS

Mothers' characteristics	*Knowledge of purposes of growth chart (2-3 answers correct)*					*Correct interpretation of own child's chart*					*Correct interpretation of 2 of 3 sample charts*				
	No.	%	χ^2	df	p	No.	%	χ^2	df	p	No.	%	χ^2	df	p
Educational level															
no schooling	72/226	32				35/175	20				52/226	23			
1-4 years	67/170	39				77/140	55				103/170	61			
5+ years	65/148	44				111/127	87				16/148	78			
Total	204/544	38	5.9	2	<0.05	223/442	50	130.9	2	<0.001	271/544	50	121.0	2	<0.001
Parity															
1 child	26/100	26				41/85	48				51/109	47			
>1 child	179/447	40				183/357	51				221/438	50			
Total	205/547	37	9.2	1	<0.005	224/442	51	0.14	1	n.s.*	272/547	50	0.3	1	n.s.
Attendance rate															
0	7/105	7				n.a.					34/105	32			
<50%	47/119	39				47/119	39				59/119	50			
50-74%	72/183	39				87/183	48				93/183	51			
75+%	79/140	56				90/140	64				86/140	61			
Total	205/547	37	70.1	3	<0.001	224/442	51	17.0	2	<0.001	272/547	50	20.4	3	<0.001
Number of times weighed															
0	7/105	7									32/105	30			
1-12	84/213	39				97/213	46				106/213	50			
13-24	85/172	49				96/172	56				102/172	59			
25+	29/57	51				31/57	54				30/57	53			
Total	205/547	37	63.3	3	<0.001	224/442	51	4.4	2	n.s.	272/547	50	24.4	3	<0.001
Significant associations with attendance after controlling, using the Mantel-Haenszel test, for:															
educational level			40.9	1	<0.001	education		4.5	1	<0.05	education		5.4	1	<0.025
parity			51.7	1	<0.001										

* n.s. means p>0.1

7.3.3 *Understanding of their own child's growth chart*

The mothers were asked to point to the mark on the chart which corresponded to their child's most recent weight and then to say whether that indicated if the child was growing well or not. (The student nurses were instructed to classify a child as growing well only if the weight had increased at a rate parallel to the curve or more rapidly since the previous weighing. Otherwise they were to classify the child as not growing well). The hypothesis was that a mother's ability to interpret growth charts would be affected by her educational level, the number of children she had, and the child's attendance rate.

Thirty-seven per cent of the 442 mothers who had growth charts said they did not know where the mark was on the chart that indicated the child's most recent weighing. Of the 277 who answered, 230 or 83% did correctly point to the mark indicating the last weighing, and 227 or 82% were able to state correctly whether their child had grown satisfactorily or not at the last weighing. Table 7.3 shows that the mother's education had a stronger association with correct interpretation of the weight trend than did attendance. However, increased attendance was still significantly associated with correct interpretation when the mother's educational level was controlled for ($X^2_{MH}=4.5$, 1 d.f., $p<0.05$). Even mothers with no schooling may have learned to interpret the charts from attending sessions as shown by the fact that 37 of the 49 mothers (76%) with no schooling who answered the question were able to state whether their child had grown well or not. There was no significant association with parity. The health workers did not formally teach mothers how to interpret the weight line in the health education talks, but sometimes during the individual consultations for at-risk children they did point to the child's weight line and comment that the line was not satisfactory, and that it was desirable for it to move in an upward direction.

7.3.4 *Understanding of sample growth charts*

Three sample charts (Appendix D) were shown to the mothers. They were asked if the weight line on each chart meant that the child was growing well or not. The charts were:
Chart A: a weight line increasing parallel to the reference curve.
Chart B: a weight line which had been completely stationary for the last four months.
Chart C: a weight line which had clearly decreased for the last four months.

Thirty-four per cent of mothers declined to answer this question, saying they did not know how to read growth charts. Of the 361 mothers who answered, 75% correclty interpreted at least two of the three charts. There was little difference between the three charts in the percentage of mothers who could correctly interpret them, although Table A10 shows that slightly fewer correctly interpreted the chart with the stationary weight line.

Mothers who correctly interpreted at least two of the three charts tended to have higher educational levels and attendance rates as shown in Table 7.3. Although the association was much stronger for the mother's educational level than for the attendance rate, attendance was still positively associated with understanding at least two charts even when educational level was controlled for (X^2_{MH}=5.4, 1 d.f., p<0.025). There was no significant association between being able to interpret the growth charts and parity, similar to what was found for interpretation of their own child's chart.

7.4 Feeding of Young Children

Mothers were asked six questions to ascertain their knowledge and practices with regard to the feeding of young children. All the questions asked concerned information that was taught in the child health sessions.

7.4.1 *Feeding of a child who is not growing well*

If a mother said that one of the sample charts indicated a child was not growing well, she was asked what she would do for the child. Details of the answers are given in Table A11. Most mothers found this question easy to answer, and listed a variety of foods that should be given to the child, as they had been taught in the sessions. Up to four answers were recorded for each mother. Eighty-eight per cent of mothers responded that they would give the child a high protein food, such as beans, peanuts, soya, eggs, milk and cassava leaves, while about 10% said they would take the child to the health centre. Ten per cent of mothers mentioned giving the child an anthelminthic drug and 12% giving other, unspecified drugs, both of which were scored as incorrect answers. Only six mothers (1%) could not give at least one correct answer to this question, while 62% gave three or more correct answers.

Table 7.4 shows that the ability to give three or more correct answers was significantly related to tribe and to higher levels of education and attendance, but not to parity or socio-economic level. Education showed the strongest association with knowing how to feed a child who was not growing well, but increased attendance was still significantly associated with giving three or more correct answers when the mother's educational level was controlled for (X^2_{MH}=13.7, 1 d.f., p<0.001).

7.4.2 *Response of mothers to anorexia*

Although mothers were encouraged to state various actions they might take if their child had a poor appetite, they had few ideas on this subject. Table A12 shows that 67% of mothers gave one correct answer and 11% gave two, while 22% gave no correct answer. The most commonly reported response was to strongly encourage the child to eat, mentioned by 45% of mothers. Twenty-five per cent said they would go to the health centre, while 16% said they would offer the child his or her favourite food. The main incorrect responses reported were to give the child an enema to help him or her regain an appetite, reported by 16% of mothers, to give liquids or breastmilk only, reported by 10%, and to give an anthelminthic, reported by 8%. Interestingly, giving at least one correct answer was not significantly associated with any of the mother's measured characteristics of attendance, education, parity, tribe or socio-economic level (Table 7.4).

Table 7.4
ASSOCIATIONS BETWEEN MOTHERS' CHARACTERISTICS AND QUESTIONS ON FEEDING OF YOUNG CHILDREN (I)

Mothers' characteristics	*Response to child's lack of growth (3-4 answers correct)*					*Response to anorexia (1-3 answers correct)*					*Introduction of all solid foods before 9 months of age*				
	No.	%	X^2	df	p	No.	%	X^2	df	p	No.	%	X^2	df	p
Educational level															
no schooling	107/226	47				174/226	77				127/226	56			
1-4 years	106/170	63				133/170	78				104/170	61			
5+ years	122/148	82				116/148	78				66/148	45			
Total	335/544	62	46.6	2	<0.001	423/544	78	0.13	2	n.s.*	297/544	55	9.8	2	<0.01
Parity															
1 child	58/109	53				79/109	73				67/109	62			
>1 child	279/438	64				347/438	79				232/438	52			
Total	337/547	62	3.6	1	<0.1	426/547	78	1.9	1	n.s.	299/547	55	2.2	1	n.s.
Tribe															
Wangiti	125/226	55				174/226	86				146/226	65			
Wahema	187/270	69				208/270	77				126/270	47			
Other	25/51	49				44/51	77				27/51	53			
Total	337/547	62	13.9	2	<0.001	426/547	78	2.3	2	n.s.	299/547	55	16.0	2	<0.001
Socio-economic level															
1-5 points	95/165	58				135/165	82				102/165	62			
6-9 points	188/294	64				225/294	76				158/294	54			
10-19 points	54/88	61				66/88	75				39/88	44			
Total	337/547	62	1.8	2	n.s.	426/547	78	2.2	2	n.s.	299/547	55	7.3	2	<0.025
Attendance rate															
0	44/105	42				80/105	76				55/105	52			
<50%	71/119	60				97/119	82				61/119	51			
50-74%	120/183	66				139/183	76				104/183	57			
75+%	102/140	73				110/140	79				79/140	56			
Total	337/547	62	26.1	3	<0.001	426/547	78	1.5	3	n.s.	299/547	55	1.2	3	n.s.
Number of times weighed															
0	44/105	42				74/105	70				55/105	50			
1-12	127/213	60				168/213	79				118/213	55			
13-24	123/172	71				137/172	80				96/172	56			
25+	43/57	75				47/57	82				30/57	53			
Total	337/547	62	29.3	3	<0.001	426/547	78	3.6	3	n.s.	299/547	55	1.9	3	n.s.

Significant associations with attendance after controlling, using the Mantel-Haenszel test, for:

education	13.7	1	<0.001	education	1.7	1	n.s.
tribe	20.8	1	<0.001	tribe	1.1	1	n.s.

*n.s. means p>0.1

7.4.3 *Age of introduction of solid foods*

Mothers were asked when they started giving their child each of the following foods: porridge, fruit, vegetables, beans, meat or fish, and eggs. The health workers taught mothers attending the child health sessions to start giving porridge when the child was three to four months old, and to add foods gradually so that the child was eating essentially the same food as the family by nine months of age.

About 90% of mothers said they had introduced porridge, fruit, vegetables or eggs before the child reached nine months of age (Table A13). However, only 78% reported giving beans and 64% meat or fish by that age. Overall, 55% of mothers said that they had given all the listed foods before the child was nine months of age. There was a significant association between the introduction of all foods before nine months of age and educational and socio-economic level and tribe, but no association with parity, as shown in Table 7.4. A higher level of attendance was still not associated with giving all the foods by nine months of age, even when tribe, the most strongly associated variable, was controlled for (X^2_{MH}=1.1, 1 d.f., n.s.).

7.4.4 *Frequency of feeding*

Mothers were advised at child health sessions to feed weanling children at least three times a day, and more often if possible. When mothers were asked how many times a day a child of one or two years of age should eat, 5% answered twice, 60% answered three times, and 33% answered four or more times (Table 7.5). An answer of four or more times was not significantly associated with any of the mother's measured characteristics except tribe (Table 7.6). Thirty-eight per cent of Wahema mothers, compared to 31% of Wangiti and 18% of mothers in the "Other" tribe, professed this belief. Attendance was still not significantly associated with an answer of four or more times when tribe was controlled for (X^2_{MH}=0.01, 1 d.f., n.s.).

Table 7.5
MOTHERS' STATEMENTS AND PRACTICES CONCERNING FREQUENCY OF FEEDING OF CHILDREN AGED 12-35 MONTHS OF AGE

	Mothers' statements		*Children's meals on previous day*	
Frequency of meals	*No.*	*%*	*No.*	*%*
1-2 times per day	27	5	76	23
3 times	329	60	196	59
4+ times	181	33	62	19
No answer	10	2		
No. of respondents	537		334	

It was difficult to distinguish in Swahili between eating a meal and eating food as a snack, which is why the word "times" was used in the question. Snacks in many societies are not considered to be "food" but part of a pastime, for example, eating fruit while walking somewhere (Wilson 1985). The question thus asked mothers to remember the number of times they gave the child a quantity of food substantial enough for them to classify it as a meal. It is likely that even if children ate fruit or a snack such as sweet potato, the mother did not consider this as a "time".

In a further question, the mothers were asked what the child ate on the day previous to the interview and the answers were always given in terms of a meal; no-one mentioned fruit or anything which might be construed as a snack. Answers to this question were analyzed for children aged 18 to 36 months of age. Table 7.5 shows that more mothers remembered the teaching about frequent feeding of children than actually carried it out in practice. The child's having eaten three or more meals on the day previous to the interview was significantly associated with higher rates of attendance, higher parity, and with tribe, but not with the mother's educational or socio-economic level (Table 7.6). Eighty-four per cent of Wahema mothers compared to 70% of "Other" mothers and 67% of Wangiti had given the child three or more meals on the previous day. The association with attendance was not significant after controlling for tribe (X^2_{MH}=2.8, 1 d.f., n.s.).

7.4.5 *Type of food eaten by index child on the previous day*

Mothers were taught in the child health sessions to feed their children a variety of foods, not just the staple foods. For children who were not growing well, mothers were advised by the health workers to feed the child cassava leaves and beans, and if possible, peanuts or an egg once or twice a week. The staple foods in the area were mainly cassava, sweet potatoes and bananas, and less commonly rice and maize. These were usually eaten with a sauce, such as vegetables, beans or peanuts, although sometimes they were eaten alone.

Table 7.6
ASSOCIATIONS BETWEEN MOTHERS' CHARACTERISTICS AND QUESTIONS ON FEEDING OF YOUNG CHILDREN (II)

Mothers' characteristics	*Mothers' beliefs re feeding 4 times/day*					*Index children eating 3+ meals on previous day*					*Score of 9+ points for type of food eaten by index children*				
	No.	%	χ^2	df	p	No.	%	χ^2	df	p	No.	%	χ^2	df	p
Educational level															
no schooling	68/226	30				92/123	75				34/123	27			
1-4 years	65/170	38				86/111	77				46/111	41			
5+ years	48/148	32				78/97	80				37/97	38			
Total	181/544	33	3.3	2	n.s.*	256/331	77	0.9	2	n.s.	117/331	35	5.3	2	<0.1
Parity															
1 child	35/109	32				32/51	63				15/51	29			
>1 child	146/438	33				26/283	80				102/283	36			
Total	181/547	33	0.01	1	n.s.	258/334	77	6.1	1	<0.025	117/334	35	0.6	1	n.s.
Tribe															
Wangiti	70/226	31				84/125	67				27/123	22			
Wahena	102/270	38				146/169	84				77/170	45			
Other	9/51	18				28/40	70				13/41	32			
Total	181/547	33	8.6	2	<0.025	258/334	77	25.9	2	<0.001	117/334	35	17.3	2	<0.001
Socio-economic level															
1-5 points	59/165	36				66/92	72				30/94	32			
6-9 points	92/294	31				148/187	79				68/185	37			
10-19 points	30/88	34				44/55	80				19/55	34			
Total	181/547	33	1.0	2	n.s.	258/334	77	1.8	2	n.s.	117/334	35	0.6	2	n.s.
Attendance rate															
0	38/105	36				37/53	70				16/53	30			
<50%	33/119	28				56/73	77				23/72	32			
50-74%	57/183	31				81/112	72				36/113	32			
75+%	53/140	38				84/96	87				42/96	44			
Total	181/547	33	3.7	3	n.s.	258/334	77	8.9	3	<0.05	117/334	35	4.5	3	n.s.
No. of times weighed															
0	38/105	36				37/53	70				16/53	30			
1-12	67/213	31				88/114	77				38/114	33			
13-24	56/172	33				110/141	78				48/141	34			
25+	20/57	35				23/26	88				15/26	58			
Total	181/547	33	0.8	3	n.s.	258/334	77	3.5	3	n.s.	117/334	35	6.5	3	<0.1
Significant associations with attendance after controlling, using the Mantel-Haenszel test, for:															
	tribe		0.01	1	n.s.	parity		4.8	1	<0.05	tribe		1.67	1	n.s.
						tribe		2.8	1	n.s.					

* n.s. means p>0.1

A simple scoring system was devised to assess the quality of the food eaten by children 18-36 months of age on the day previous to the interview. The lack of information about what children ate as snacks might have affected the scores. It was shown in a small study in rural Malaysia that children who could walk alone ate a variety of foods between meals, and obtained a "substantial" amount of calories and smaller quantities of other nutrients through snacking. Such information was collected by child-following techniques rather than by questioning mothers (Wilson 1974).

Four points were given if the meal included fish or meat (no matter what else was included), three points if beans or butter were included, two points if vegetables were included, and one point if the meal consisted solely of a staple food. The scores received ranged from one to sixteen, varying with both the type of food and the number of meals eaten. Tables 7.6 and A14 show that 65% of children received a score of eight points or less. A score higher than eight points was significantly associated only with the mother's tribe: 45% of Wahema children compared to 32% of "Other" children and 22% of Wangiti received a score of eight points or more. There was no significant association with attendance even after controlling for tribe (X^2_{MH}=1.67, 1 d.f., n.s.).

7.5 Knowledge and Practices Concerning Diarrhoea

Three questions were asked about the mothers' knowledge and practices concerning diarrhoea. All were on information taught at the child health sessions.

7.5.1 *The causes of diarrhoea*

Up to three responses were recorded for each mother. Table A15 shows that three-quarters of mothers could give at least one correct answer to this question. The most common response was that worms caused diarrhoea (49% of mothers), followed by the child's hands being dirty (22%), and unclean water (19%). All the responses were taught in the sessions as causes of diarrhoea, and were coded as correct answers, although intestinal worms are not an important cause of diarrhoea (*Davey and Wilson* 1965). Much emphasis was put on the subject of worms in the child health sessions and the women's answers reflected this.

The ability of mothers to give at least one correct answer was significantly associated with higher levels of education and attendance, and with parity and tribe, but not with socio-economic level (Table 7.7). Increased attendance was still significantly associated with the ability to give at least one correct answer even when the variable most strongly associated with this, mother's tribe, was controlled for (X^2_{MH}=5.4, 1 d.f., p<0.025).

7.5.2 *Treatment of diarrhoea*

Women were asked to describe what they did the last time their child had diarrhoea. In the sessions, they had been told to give the child plenty of liquids, preferably an oral rehydration solution. Up to four answers were recorded for each mother (Tables A16 and A17.) Forty-seven per cent of

Table 7.7
ASSOCIATIONS BETWEEN MOTHERS' CHARACTERISTICS AND QUESTIONS ON DIARRHOEA

Mothers' characteristics	*Knowledge of causes of diarrhoea (1-3 answers correct)*					*Treatment of diarrhoea (3-4 answers correct)*					*Ability to make ORS correctly*				
	No.	%	X^2	df	p	No.	%	X^2	df	p	No.	%	X^2	df	p
Educational level															
no schooling	152/226	67				69/226	30				13/226	6			
1-4 years	123/170	72				74/170	43				22/170	13			
5+ years	129/148	87				96/148	65				34/148	23			
Total	404/544	74	19.1	2	<0.001	239/544	44	42.8	2	<0.001	69/544	13	23.9	2	<0.001
Parity															
1 child	72/109	66				37/109	34				8/109	7			
>1 child	335/438	76				203/438	46				62/438	14			
Total	407/547	74	4.4	1	<0.05	240/547	44	4.9	1	<0.05	70/547	13	3.0	1	<0.1
Tribe															
Wangiti	144/226	64				102/226	45				28/226	12			
Wahema	229/270	85				125/270	46				40/270	15			
Other	34/51	67				13/51	25				2/51	4			
Total	407/547	74	30.5	2	<0.001	240/547	44	7.7	2	<0.025	70/547	13	4.6	2	<0.1
Socio-economic level															
1-5 points	117/165	71				53/165	32				6/165	4			
6-9 points	220/294	75				146/294	50				48/294	16			
10-19 points	70/88	79				41/88	47				16/188	18			
Total	407/547	74	2.3	2	n.s.*	240/547	44	13.5	2	<0.001	70/547	13	17.9	2	<0.001
Attendance rate															
0	74/105	70				19/105	18				6/105	6			
<50%	78/119	65				49/119	41				6/119	5			
50-74%	140/183	76				88/183	48				27/183	15			
75+%	115/140	82				84/140	60				31/140	22			
Total	407/547	74	10.6	3	<0.025	240/547	44	44.8	3	<0.001	70/547	13	22.7	3	<0.001
No. of times weighed															
0	74/105	70				19/105	17				6/105	6			
1-12	146/213	69				89/213	42				23/213	11			
13-24	139/172	81				92/172	54				23/172	13			
25+	48/57	84				40/57	70				18/57	32			
Total	407/547	74	14.9	3	<0.005	240/547	44	57.2	3	<0.001	70/547	13	23.5	3	<0.001

Significant associations with attendance after controlling, using the Mantel-Haenszel test, for:

Knowledge of causes	X^2	df	p	Treatment	X^2	df	p	Ability to make ORS	X^2	df	p
education	3.9	1	<0.05	education	29.9	1	<0.001	education	13.6	1	<0.001
parity	24.2	1	<0.001	parity	40.2	1	<0.001	s-e level	17.2	1	<0.001
tribe	5.4	1	<0.025	tribe	38.3	1	<0.001				
				s-e level	46.6	1	<0.001				

* n.s. means p>0.1

respondents mentioned putting salt and sugar in boiled water, while 36% said they went to the health centre. Only 16 mothers, or 3%, said they had used packaged oral rehydration salts (ORS). The use of traditional medicine or enemas were scored as incorrect answers, and were mentioned by 16% of mothers. Of the mothers who gave their child a sugar-salt solution, 38% prepared it by the glassful rather than by the litre as recommended. Of the 164 women who prepared the solution by the litre, 61 or 37% used too little sugar, and only 10 or 6% used an incorrect amount of salt.

The ability of mothers to give at least three correct answers was significantly associated with all the characteristics of the mother which were examined (Table 7.7). The most strongly associated variable was mother's educational level, but attendance was still significantly associated with giving three correct answers after controlling for educational level (X^2_{MH}=29.9, 1 d.f., p<0.001).

7.5.3 *Ability to make oral rehydration solution*

Only 70 mothers, or 13%, could correctly describe how to make up the solution as it was taught in the child health sessions. The correct answer was to mix one beer bottle (one litre) of clean water with three or four teaspoonfuls of sugar and half a teaspoonful of salt. If a packet of ORS was used, the powder was to be dissolved in one litre of clean water.

Knowing how to make a rehydration solution was significantly associated with higher attendance, educational and socio-economic levels, but not with parity or tribe (Table 7.7). Attendance was still significantly associated with the ability to make the solution correctly, after controlling for the most strongly associated variable, educational level (X^2_{MH}=13.6, 1 d.f. p<0.001).

7.6 Summary

In conclusion, a higher attendance level, after controlling for other positively associated variables, was significantly related to mothers' ability to correctly answer the three questions about growth charts, the three questions about diarrhoea, and one of the six questions on feeding, namely how they would respond to a child's lack of growth. Seven out the total of twelve questions appeared to be affected by more frequent attendance at child health sessions. Four of the six questions about feeding beliefs and practices were strongly associated with tribe and socio-economic level but not with attendance rate. The other strong influence in most of these questions was the mother's educational level.

7.7 Logistic Regression Analysis of Questions on Knowledge and Practices

After the study of the interrelationships between the five selected characteristics of the mother and child (Section 7.2) and of the association of these characteristics with the ability to answer questions on knowledge and practices (Sections 7.3 to 7.5), the confounding and interactive effects between variables were evaluated using logistic regression analysis.

The Generalized Linear Interactive Modelling (GLIM) computer package was used for the analysis. A binomial linkage is specified and the logistic transformation used. The odds ratio relative to the baseline level of each factor included in the model is then estimated by taking the exponential of the parameter estimates for the higher levels of that factor.

Composite scores were calculated for each of the following variables:

1. growth charts: combining the two questions on the interpretation of the chart and the question on their purpose.
2. feeding: combining the six questions of knowledge and practices related to child feeding.
3. diarrhoea: combining the six questions of knowledge and practices when a child has diarrhoea.
4. knowledge: combining the five questions about knowledge of charts, feeding and diarrhoea.
5. practices: combining the seven questions about practices in feeding and diarrhoea
6. total score: combining all twelve questions on knowledge and practices.

The relationships of these composite scores to the mother's education and socio-economic level, parity, tribe and attendance rate, are shown in Tables A18 and A19.

A logistic model was fitted to each of the composite scores in turn. A value of one was applied if the proportion of correct answers was greater than 50%; otherwise a value of zero was applied. The number and proportion of women answering more than 50% of questions correctly is shown in Table A20. The variables were generally fitted in a stepwise procedure, starting with the variable which accounted for most of the variance in the score. The significance of each variable was assessed after controlling for all the previous significant variables ie. those not in parentheses, except for attendance and number of weighings, which were assessed separately after fitting the significant confounding variables. In each case the modelling approach sought to determine if the number of times the child had been weighed or the proportion of possible visits made ("attendance") had an effect on the score, after allowing for possible confounding variables such as mother's education, parity, tribe and socio-economic level. It also allowed the contribution of the other variables to the outcomes to be assessed. The variables were grouped as follows prior to analysis:

Number of weighings: 0, 1-6, 7-12, 13-24, 25+

Attendance: 0, <50%, 50-74%, 75+%

Mother's education: 0, 1-4 years, 5+ years

Parity: 1, 2, 3+ children

Socio-economic level: 0-5, 6-9, 10+ points

Tribe: Wangiti, Wahema, Other

The number and proportion of households in each category are shown in Tables A3 and A9.

Table 7.8 shows that the composite score for knowledge about growth charts was strongly related to the mother's educational level, but after controlling for education, there was still a significant association with attendance rate and number of weighings. Whether a mother had one child or more was not significantly associated with her knowledge about growth charts.

The composite score for feeding was significantly associated with the socio-economic level and tribe, but not with educational level (Table 7.9). After allowing for socio-economic level and tribe, a high score for feeding knowledge and practices was significantly associated with the number of weighings. Feeding was the only composite score not significantly associated with the mother's education. The strongest influences on the composite score for diarrhoea knowledge and practices were educational and socio-economic level, although even after allowing for them, the number of weighings and attendance were significantly associated with the score for diarrhoea (Table 7.10). Tribe was not significantly related, and the addition of parity did not substantially affect the model. All associations were in the direction expected.

Table 7.8
EFFECT OF NUMBER OF WEIGHINGS AND ATTENDANCE ON MOTHERS' COMPOSITE SCORE FOR KNOWLEDGE ABOUT GROWTH CHARTS

Source	*Deviance*	*df*	*Reduction in deviance*	*df*	*p*
null	739.2	543			
education	563.5	540	175.7	3	<0.001
tribe	558.6	538	4.9	2	<0.1
(s-e level	557.8	536	0.8	2	n.s.)**
(parity	557.6	536	1.0	2	n.s.)
weighings	528.9	534	29.7*	4	<0.001
attendance	530.4	535	28.2*	3	<0.001

* after controlling for mother's education and tribe
** n.s. means p>0.1 in all the tables

Table 7.9
EFFECT OF NUMBER OF WEIGHINGS AND ATTENDANCE ON MOTHERS' COMPOSITE SCORE FOR FEEDING KNOWLEDGE AND PRACTICES

Source	*Deviance*	*df*	*Reduction in deviance*	*df*	*p*
null	753.4	543			
(education	750.9	540	2.5	3	n.s.)
s-e level	743.8	541	9.6	2	<0.01
tribe	734.5	539	9.3	2	<0.01
parity	729.8	537	4.7	2	<0.1
weighings	711.2	533	18.6*	4	<0.001
attendance	732.0	536	2.5**	3	n.s.

* after controlling for socio-economic level, tribe and parity
** after controlling for socio-economic level and tribe

Table 7.10
EFFECT OF NUMBER OF WEIGHINGS AND ATTENDANCE ON MOTHERS' COMPOSITE SCORE FOR DIARRHOEA KNOWLEDGE AND PRACTICES

Source	*Deviance*	*df*	*Reduction in deviance*	*df*	*p*
null	632.8	543			
education	585.7	540	47.1	3	<0.001
s-e level	569.9	538	15.8	2	<0.001
parity	564.3	536	5.6	2	<0.1
(tribe	561.4	534	2.9	2	n.s.)
weighings	530.0	532	34.3*	4	<0.001
attendance	542.8	533	21.5*	3	<0.001

* after controlling for mother's education, socio-economic level and parity

Table 7.11 shows that the composite score for knowledge was most strongly associated with the mother's educational level, followed by tribe and parity. A higher composite knowledge score was associated with higher attendance levels, but not with a higher number of weighings. Both attendance and number of weighings were found to have a significant effect on the proportion with a high composite score for practices, after allowing for confounding variables. Education made the largest contribution to the model, and the addition of tribe was also significant (Table 7.12). Socio-economic level showed no significant association with either of the composite scores for knowledge and practices. Parity significantly affected knowledge but not practices. Again, all associations were positive. The total score for all twelve questions was most strongly related to the mothers' educational level (Table 7.13). The addition of tribe did not substantially affect the model, and socio-economic level and parity were not significantly related to the total score. Attendance appeared to be a more important influence than the number of weighings, although both were significantly associated with the total composite score after controlling for educational level.

In sum, the visits to child health sessions by a mother, whether measured by the absolute number of times or by the proportion of the possible times that she had taken a child to a session, appeared to have had a significant effect on

Table 7.11
EFFECT OF NUMBER OF WEIGHINGS AND ATTENDANCE ON MOTHERS' COMPOSITE SCORE FOR KNOWLEDGE

Source	*Deviance*	*df*	*Reduction in deviance*	*df*	*p*
null	740.5	543			
education	640.9	540	99.6	3	<0.001
tribe	632.7	538	8.2	2	<0.025
(s-e level	630.0	536	2.7	2	n.s.)**
parity	626.2	536	6.5	2	<0.05
weighings	617.6	532	8.6*	4	<0.1
attendance	617.9	533	8.3*	3	<0.05

* after controlling for mother's education, tribe and number of children
** n.s. means p>0.1 in all the tables

Table 7.12
EFFECT OF NUMBER OF WEIGHINGS AND ATTENDANCE ON MOTHERS' COMPOSITE SCORE FOR PRACTICES

Source	*Deviance*	*df*	*Reduction in deviance*	*df*	*p*
null	745.6	543			
education	729.7	540	15.9	3	<0.005
tribe	720.7	538	9.0	2	<0.025
(parity	720.5	536	0.2	2	n.s.)
(s-e level	718.4	536	2.3	2	n.s.)
weighings	703.6	534	17.1*	4	<0.005
attendance	710.7	535	10.0*	3	<0.025

* after controlling for mother's education and tribe

Table 7.13
EFFECT OF NUMBER OF WEIGHINGS AND ATTENDANCE ON MOTHERS' TOTAL COMPOSITE SCORE FOR KNOWLEDGE AND PRACTICES

Source	*Deviance*	*df*	*Reduction in deviance*	*df*	*p*
null	752.3	543			
education	675.0	540	77.3	3	<0.001
tribe	669.5	538	5.5	2	<0.1
(s-e level	669.5	536	0	2	n.s.)
(parity	667.3	536	2.2	2	n.s.)
weighings	656.8	534	12.7*	4	<0.025
attendance	654.0	535	15.5	3	<0.005

* after controlling for mother's education and tribe

the ability of mothers to answer the questions correctly. A score of over 50% in all of the composite variables was significantly associated with higher levels of attendance or a higher number of weighings.

7.8 Results of Anthropometric Measurements

7.8.1 *Anthropometric status of children in Boga Health Zone*

At the end of the interview with the mother, her children under five years of age were measured. A total of 685 children were measured, 319 girls and 352 boys. As discussed in Chapter 4, height measurements were generally poorly done in the first village surveyed. The first set of height measurements taken in the first village were discarded, and the figures from the re-measurements were used in the analysis. Some re-measurements were done in the other villages but this was done as a check of measuring technique only, and the figures from the first measurement were used in the analysis. Households for re-measuring were randomly selected and were visited by two student nurses two to three weeks after the first measurements were taken. The differences between the measurements were less than 5 mm for 87.5% of 78 height measurements and less than 500 gm or 10% of the first measured weight for 94% of 78 weighings.

The NCHS anthropometric standards were used for classifying the children's length or height-for-age, weight-for-age, and weight-for-height as the number of standard deviations (SDs) below or above the median of the reference population. This was done with the computerized subroutine provided by the

Centers for Disease Control, Atlanta. Data editing was done to exclude values more than 4 SDs from the NCHS reference median. This excluded 23 weight measurements (3%) and 79 height measurements (11.5%). Eighteen per cent of length measurements in 6-11 month olds were excluded in this way, 15% in 12-23 month-olds, 11% in 24-35 month-olds, 12% in 36-47 month-olds and 7% in 48-59 month-olds. No record was kept of whether children were co-operative or not. The higher rates of exclusion in the six to twenty-three month-olds probably reflect the difficulties experienced in measuring the height of these children.

Table 7.14 shows the SD score distribution for weight-for-age, height-for-age and weight-for-height in the total number of children measured. The prevalence of stunting was much higher than the prevalence of wasting: 38% of children were at least 2 SD below the reference median for height-for-age, compared to 4.5% of children below the same cut-off for weight-for-height.

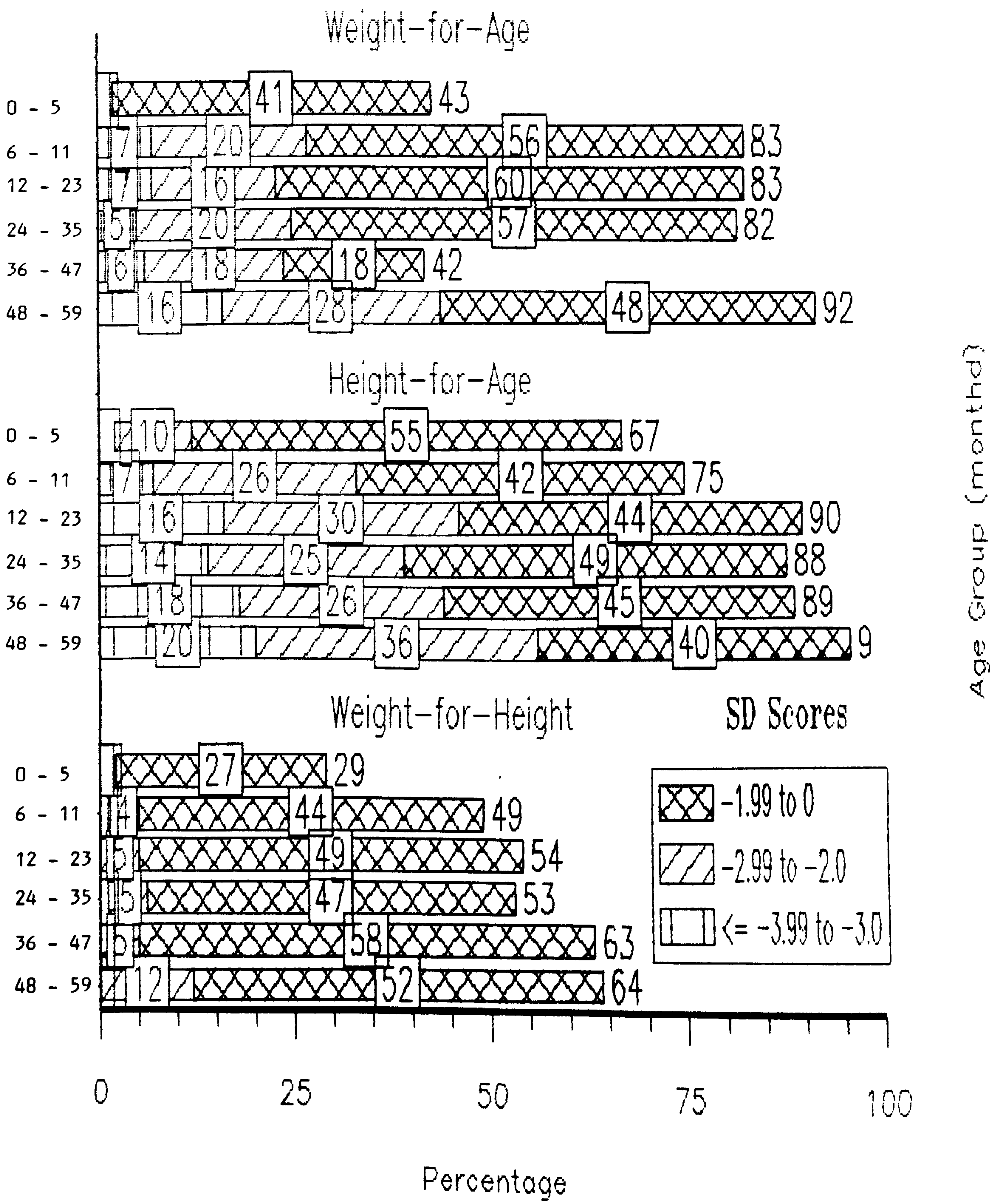
Table 7.14
STANDARD DEVIATION SCORES OF ANTHROPOMETRIC STATUS, CHILDREN AGED ONE TO 59 MONTHS, BOGA HEALTH ZONE

SD Score	*Weight-for-age*		*Height-for-age*		*Weight-for-height*	
	No.	*%*	*No.*	*%*	*No.*	*%*
-3.99 to -3.0	34	5	77	13	3	0.5
-2.99 to -2.0	108	16	149	25	29	4
-1.99 to -1.0	225	34	174	29	98	15
-0.99 to 0	155	23	109	18	205	31
0.01 to 4.0	140	21	97	16	322	49
Total	662	99	606	101	657	99.5

Figure 7.1 shows the SD scores for weight and height by age and weight-for-height for children of different age-groups. A high percentage of children had a weight-for-age 2 SD scores or more below the reference median from the age of six months upwards. One would expect about 2.5% of children to be below this cut-off point, if the Boga children were identical to the reference population. Between six and 47 months, the prevalence rate varied between 23% and 27%, and at 48-59 months, it rose to 34%. However, there were only 25 measurements for children in the 48-59 month age-group and the results may not be representative. A deficit in length-for-age was already present in 12% of children under six months of age and increased in prevalence with age to a maximum of 55% of children aged 48-59 months who were 2 SD scores or more below the reference median. By contrast, the prevalence of weight-for-height 2 SD scores or more below the median was only five to six per cent, except in the lowest and highest age-groups.

Although the height deficit in children under six months of age might have been due to measurement error, it may actually indicate that children were smaller at birth than would be expected from the reference tables. The Kasongo studies indicated this, and there is some evidence that it is the case in many developing countries (*Van Lerberghe* 1987). If the figures for the age-group 47-59 months are discounted because of the small sample size in this age-group, the highest prevalence of stunting in Boga was in the 12-23 month age-group. This may be partly due to the fact that some children were measured standing up instead of

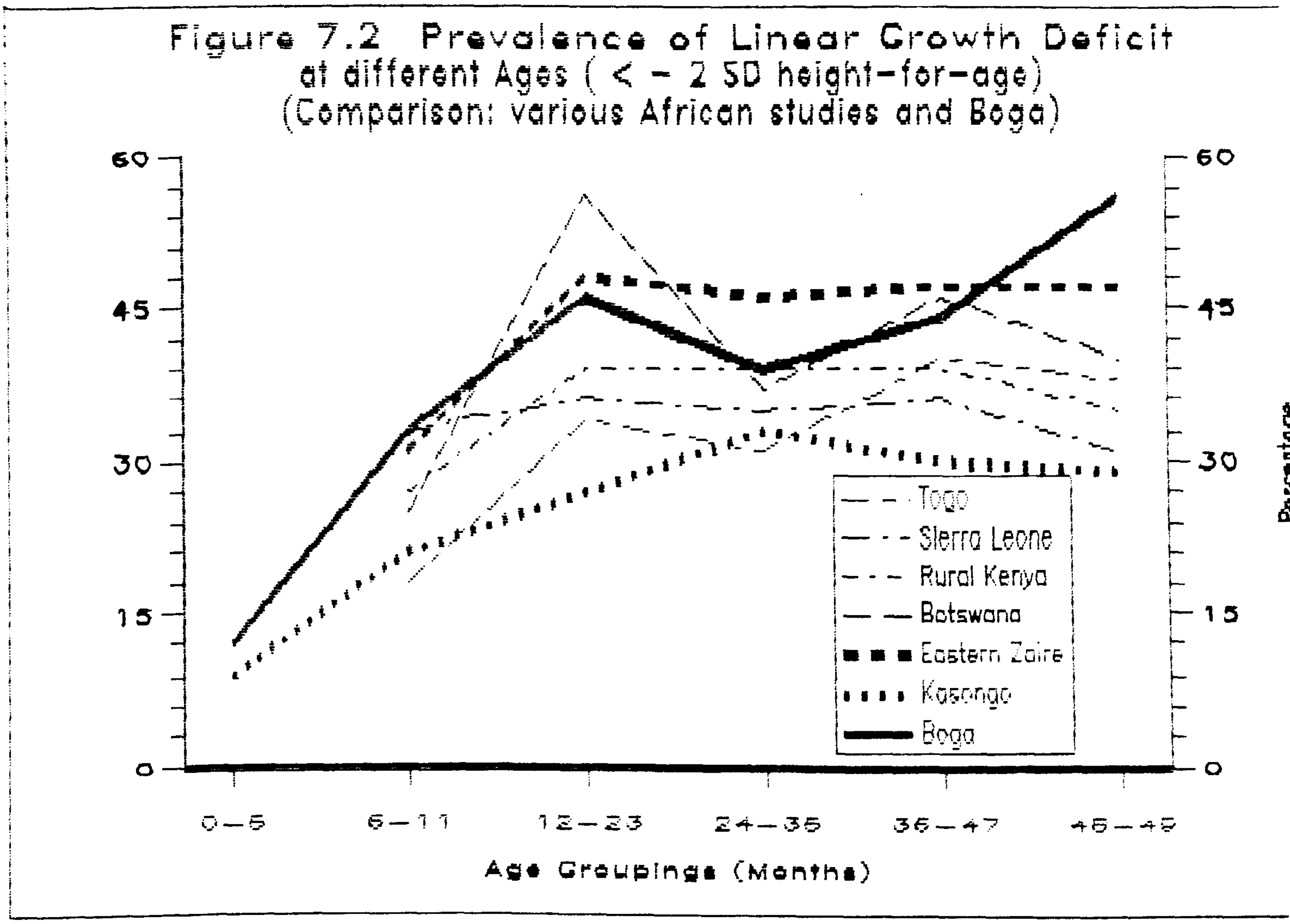
Fig. 7.1 Proportion of Children Aged 0 – 59 Months with a Deficit in Weight or Height, Both sexes (Boga Health Zone)



lying down; the results would be biased to lower measurements and a higher prevalence rate of stunting than in reality. Also, the reference data change at 30 months from a measurement of length to measurement of height, which has been shown to give rise to an artificial decrease in prevalence rates of low height-for-age at the age of two years (*Dibley et al* 1985).

Despite this, the peak in Boga at 12-23 months was similar to results from two other studies in Zaire as shown in Figure 7.2. In Eastern Zaire, the prevalence rate of stunting peaked in the same age-group and stayed almost at the same high rate up to the age of five years (*Keller and Fillmore* 1983). In Kasongo, the proportion of stunted children peaked at 30 months and stabilized at 29-30% for older age-groups (*Van Lerberghe* 1987). In most of the other studies reviewed by Keller and Fillmore (1983) however, stunting showed no consistent variation by age.

It is hazardous to compare data gathered under very different conditions of sampling and survey technique, but Figure 7.2 in which the results of this study on the Boga children are compared with results from other studies in Zaire and elsewhere in Africa shows that there was generally a steep rise in the prevalence of stunting after the age of 11 months and little or no catch-up growth after that. The Boga children had a deficit in linear growth which was between the higher rates of deficit reported in Botswana and Eastern Zaire and the lower rates reported in Kasongo, rural Kenya, Sierra Leone and Togo.



Sources:

***Keller W, Fillmore CM,* 1983**

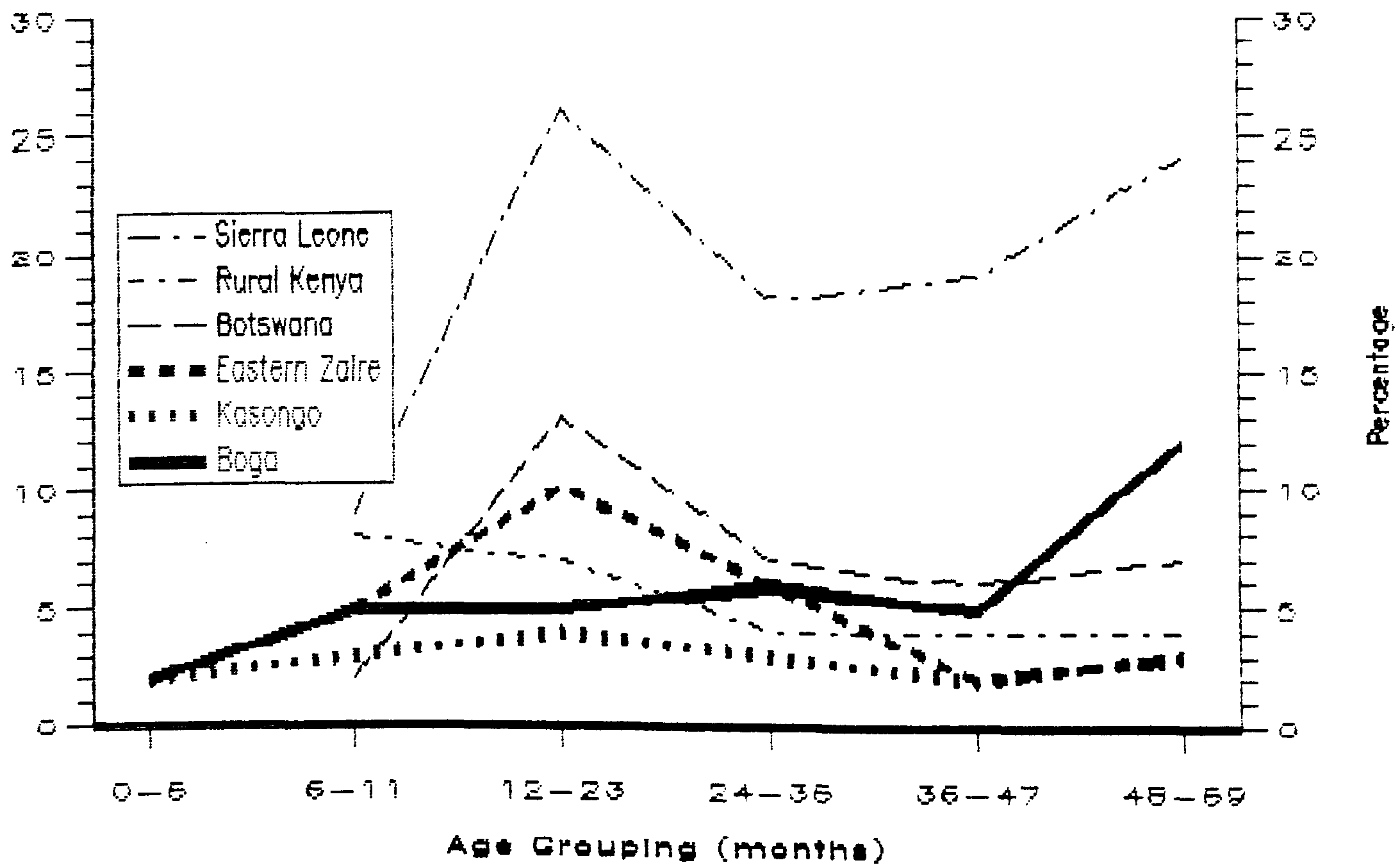
***Van Lerberghe W,* 1987**

Wasting showed the highest prevalence rates in the 12-23 month-old children in the studies reviewed by Keller and Fillmore (1983). Figure 7.3 compares data on wasting from a number of African countries. The data from Boga show that the prevalence rates for wasting were similar at five to six per cent for all the age-groups between 12 and 47 months. Prevalence rates of wasting varied only a little between age-groups in Boga, as in Kasongo, and were generally lower than in the other African studies.

The stresses on the health and nutrition of children in the Boga area seemed to result much more frequently in stunting than in wasting. This was consistent with the observation of local informants that cases of severe acute malnutrition and kwashiorkor were infrequent in the zone. These were mostly seen in children living with single mothers, step-mothers, or with parents who had an alcohol problem. Several cases were also seen in children whose mothers were immigrants from Uganda, without husbands and little farm-land.

The data for Boga are subject to at least two important limitations. Firstly, this was a cross-sectional survey and therefore the prevalence rates of malnutrition do not include the children who had died, who may have had a different growth profile from the measured children. Secondly, the numbers of children measured, especially in the oldest and youngest age-groups, were too small to give a representative sample of the population (*Waterlow et al* 1977).

Figure 7.3 Prevalence of Wasting
at different Ages (< – 2 SD weight–for–height)
(Comparison: various African studies and Boga)



Sources:

Keller W, Fillmore CM, 1983

Van Lerberghe W, 1987

7.8.2 *Associations between anthropometric status and mothers' characteristics*

Although the number of children measured was too small to draw a valid growth profile for the area, it was possible to compare malnourished children with non-malnourished children by examining risk factors for malnutrition, specifically, the characteristics of the mother which were measured in the survey: educational level, tribe, parity, socio-economic level and attendance. Cross-tabulations were carried out using SPSS-X and logistic regression analysis was carried out with the GLIM package for the analysis of risk factors for malnutrition. The variables were fitted as for the analyses described in Section 7.6.

Table 7.15 shows the associations between the mothers' characteristics and having a SD score of -2 or less for height-for-age and weight-for-age, and a SD score of -1 or less for weight-for-age. Tribe and socio-economic level were significantly associated with low weight-for-age and low height-for-age, while only tribe was significantly associated with low weight-for-height. Education was significantly associated only with low height-for-age, but this association was not significant after controlling for other factors, as shown in the logistic regression analysis below. The Wangiti tribe had the highest prevalence of stunting (55%) and the Wahema tribe the lowest (25%), while the opposite was true for wasting: the Wahema tribe had the highest rates (24%) and the Wangiti and "Other" tribes the lower rates (15% and 14%). The poorest socio-economic level had the highest prevalence of low weight-for-age and

Table 7.15
ASSOCIATIONS BETWEEN MOTHERS' CHARACTERISTICS AND PROPORTION OF CHILDREN WITH WEIGHT-FOR-AGE AND HEIGHT-FOR-AGE AT LEAST 2 SD BELOW THE MEDIAN AND WEIGHT-FOR-HEIGHT AT LEAST 1 SD BELOW THE MEDIAN

Mothers' characteristics	*Weight-for-age*					*Height-for-age*					*Weight-for-height*				
	No.	%	χ^2	df	p	No.	%	χ^2	df	p	No.	%	χ^2	df	p
Educational level															
no schooling	59/265	22				103/241	43				49/260	19			
1-4 years	47/193	24				73/175	42				32/194	17			
5+ years	34/201	17				49/188	26				47/200	24			
Total	140/659	21	3.5	2	n.s.*	225/604	37	14.7	2	<0.001	128/654	20	3.2	2	n.s.
Parity															
1 child	22/98	22				38/91	42				15/99	15			
>1 child	120/564	21				188/515	37				115/558	21			
Total	142/662	21	0.2	1	n.s.	226/606	37	0.7	1	n.s.	130/657	20	1.3	1	n.s.
Tribe															
Wangiti	72/248	29				121/219	55				37/250	15			
Wahema	57/354	16				84/332	25				85/349	24			
Other	13/60	22				21/55	38				8/58	14			
Total	142/662	21	14.5	2	<0.001	226/606	37	50.6	2	<0.001	130/657	20	9.8	2	<0.01
Socio-economic level															
1-5 points	59/199	30				82/180	46				46/196	24			
6-9 points	69/361	19				123/334	37				67/359	19			
10-19 points	14/102	14				21/92	23				17/85	17			
Total	142/664	21	12.7	2	<0.005	226/606	37	13.5	2	<0.001	1x30/657	20	2.3	2	n.s.
Attendance rate															
0	22/94	23				21/81	26				20/94	21			
<50%	32/155	21				62/144	43				20/154	13			
50-74%	57/240	24				94/218	43				53/237	22			
75+%	31/173	18				49/163	30				37/172	22			
Total	142/662	21	2.3	3	n.s.	226/606	37	13.3	3	<0.005	130/657	20	5.9	3	n.s.
No. of times weighed															
0	22/94	23				21/81	26				20/94	21			
1-12	48/271	18				85/248	34				42/267	16			
13-24	53/224	24				94/208	45				46/222	21			
25+	19/73	26				26/69	38				22/74	30			
Total	142/662	21	4.0	3	n.s.	226/606	37	10.9	3	<0.025	130/657	20	7.6	3	<0.1

Significant associations with attendance after controlling, using the Mantel-Haenszel test, for:

tribe	0.21	1	n.s.	education	0.44	1	n.s.	tribe	0.35	1	n.s.
socio-economic level	0.11	1	n.s.	tribe	0.25	1	n.s.				
				s-e level	0.12	1	n.s.				

* n.s. means p>0.1

height-for-age as expected, but socio-economic level showed no significant association with wasting.

No clear trend can be detected between anthropometric status and attendance rates as shown in Table 7.15. Height-for-age was the only measure which was significantly associated with attendance, and the smallest proportion of children with stunting was found in children with no growth charts and in children whose attendance rates were greater than 75%. The reason for this is likely to be that very young children were over-represented in these groups. Some children under three months would have had no growth chart because mothers frequently started to bring the child for immunization only at the age of three months. Attendance rates were higher in the first year of life and stunting was less frequent and less severe in children under 12 months of age. This is supported by looking at the association between the number of weighings and growth. Children with more than 12 weighings tended to have higher rates of stunting. These children must necessarily have been older than 11 months of age and it was in the second year of life that the deficit in stature became marked.

The prevalence of a weight-for-height at least 1 SD below the median was lowest in children with 1-12 weighings, who would mostly be children less than 15 months of age. It was highest in children with 25 or more weighings, who would be mostly children 30 months of age or older. By contrast, the studies reviewed by Keller and Fillmore (1983) found that the 12-23 month age-group had the highest prevalence of wasting.

Table A21 shows that higher rates of stunting and wasting were significantly associated with lower scores received by mothers for the composite answers of knowledge, diarrhoea and growth charts. However, logistic regression analysis showed that the combined scores did not have a significant effect on anthropometric status after accounting for tribe and socio-economic level (Table 7.16).

Logistic regression did not materially change the result of the Chi-square tests. For all three measures of children's anthropometric status, the strongest influence was tribe, followed by socio-economic level (Table 7.16). Neither the mother's educational level nor her parity appeared to have a significant independent effect. The latter contrasted with the results found for many of the questions on knowledge and practices. As for the previous logistic regression analyses, all the variables in parentheses were non-significant, and attendance and number of weighings were fitted after including only significant variables. The child's attendance rate at the child health clinics and the number of weighings were both significantly associated with a low height-for-age after controlling for tribe and socio-economic and educational level. Wasting was significantly associated, though not as strongly as stunting, with the number of weighings the child had had, but not with attendance. However, as noted above, these associations will have been strongly confounded by the age of the child.

Table 7.16
EFFECT OF NUMBER OF WEIGHINGS AND ATTENDANCE ON CHILDREN'S ANTHROPOMETRIC STATUS

Source	*Deviance*	*df*	*Reduction in deviance*	*df*	*p*
1. Weight-for-age					
null	681.6	658			
tribe	667.2	656	14.4	2	<0.001
s-e level	657.7	654	9.5	2	<0.01
(parity	657.7	653	0.0	1	n.s.)**
(education	652.9	651	4.8	3	n.s.)
weighings*	652.8	650	4.9	4	n.s.
attendance*	657.1	651	0.6	3	n.s.
2. Height-for-age					
null	792.6	603			
tribe	748.1	601	49.5	2	<0.001
s-e level	740.6	599	7.5	2	<0.05
(parity	740.5	598	0.1	1	n.s.)
education	733.2	596	7.4	3	<0.1
(practice score	740.4	597	0.2	2	n.s.)
(feeding score	739.7	597	0.9	2	n.s.)
(diarrhoea score	738.6	597	2.0	2	n.s.)
knowledge score	733.4	597	5.2	2	<0.1
weighings*	723.1	595	17.5	4	<0.005
attendance*	729.4	596	11.2	3	<0.025
3. Weight-for-height					
null	646.7	653			
education	639.8	650	6.9	3	<0.1
tribe	636.6	651	10.1	2	<0.01
(s-e level	632.8	649	3.8	2	n.s.)
(parity	631.6	648	1.2	1	n.s.)
weighings*	622.5	645	10.3	4	<0.05
attendance*	627.0	646	5.8	3	n.s.

* after controlling for previous variables not in parentheses
** n.s. means p>0.1

7.8.3 *Summary*

These data indicate that the growth pattern of children in Boga was similar to that reported in other African studies, characterized by high levels of stunting beginning at a very young age, and low levels of wasting. They show that a high proportion of children surviving to age five in this society had been subjected to many sub-optimal influences which had impaired their growth and health.

Although frequent attendance at child health sessions did have a positive effect on the knowledge and practices of mothers, it was not sufficient to counteract the effects on growth of many other factors in the child's environment, which were represented in this study only by a measure of the socio-economic level and by the tribe. What the precise elements of the "tribe" were which affected growth is not clear, but could have to do with practices of child care and feeding, access to resources such as help with child care from larger, extended families, or other factors. Socio-economic level would have had an effect in terms of giving families access to more consumer goods, including food, housing and health care.

CHAPTER 8
DISCUSSION OF SURVEY RESULTS

8.1 Introduction

The survey provided information on the knowledge and practices concerning various aspects of child care of a representative cross-sectional sample of 547 mothers of children under five in the Boga programme area. Information was also collected on the anthropometric status of 604 of their children. Evidence of the effects of the programme was sought by analyzing the survey results by differences in intensity of exposure to the programme.

A stronger basis for arguing the effect of the programme would have been obtained by using an experimental approach, as for example by studying the knowledge and practices of women before and after the programme had been implemented, or by studying changes over time (*Lilienfeld and Lilienfeld* 1980). As this was not possible, the intensity of exposure to the programme as measured by attendance rate was used. It is likely that the health service in general and the child health programme in particular were the major source of modern health information for women in this area, especially if they went to the sessions regularly. Few people had radios, there were no newspapers, and reading material of all types was scarce. There were no organized women's groups where such information would be transmitted. However, those women who did not go to the sessions could be exposed to such information through socializing with women who did.

The only measure of programme impact which was included was anthropometric status. The ultimate goal of child health programmes is to decrease morbidity and mortality in children, but the measurement of change in morbidity and mortality requires huge samples, and is methodologically difficult, time-consuming and expensive. It was decided to measure children's anthropometric status since it is a good proxy indicator of health and food consumption and reflects the same environmental factors which affect morbidity and mortality (*Mosley* 1985).

All the associations found in this study may be considered explanatory but not causal. Statistical significance is necessary but not sufficient to define an association between two variables as causal (*Lilienfeld and Lilienfeld* 1980). Conversely, in a logistic regression analysis, a variable which does not show statistical signficance must not be rejected immediately because its effect may have been nullified as a result of the variables already fitted in the model. Although the variables to be tested were generally fitted in a step-wise order, starting with those that accounted for the greatest amount of variation in the factor being measured, they were also tested in a variety of combinations to determine which were the ones that seemed to have any effect on the factor being measured.

8.2 Associations between Descriptive Variables

The complexity of the mechanisms that mediate the relationship between environmental factors and growth is shown by the fact that socio-economic level and tribe, which were significantly associated with anthropometric status, were also associated with each other and with the other descriptive variables measured in this study: education, parity and attendance. The simple associations shown by cross-tabulation are discussed below.

The historical cultural and economic dominance of the Wahema tribe appears to have extended to the present day. They had the highest socio-economic and maternal education levels of all three tribal groups and their cattle were a source of social prestige and political power as well as being important economically. People in higher socio-economic levels in this area tended to have more children. Demographic studies have often shown an association between wealth and higher parity (*Rutabanzibwa-Ngaiza et al* 1985). Children may be an important factor in creating the family wealth and caring for aged parents, and wealthier people are able to afford to have more children and to ensure their survival (*Cain* 1982, *Carael and Standbury* 1983). The family's life-stage may have affected the measures of economic well-being used in this study. A recently-married couple with young children, especially those living as a nuclear family, would have a farm restricted to a size that two adults could work, and might have accumulated fewer possessions and wealth than an older family. Some of the associations found in this study between poor socio-economic status and stunting might in fact be due to the family being at a stage of life when there were many children too young to contribute to the provision of food (*Payne* 1985b).

The mother's educational level in this study was not associated with parity, although many other studies have found a strong association between the two, with higher education being associated both with high parity and low parity, depending on the stage of development of the country. Higher education is usually associated with higher parity in the poorest countries in Africa, although in rural areas the relatiopnship is weaker than in urban areas (*Singh and Casterline* 1987). Maternal education was associated with socio-economic level, in common with most studies which have shown that better educated women tend to marry better educated men and have higher standards of living (*Cleland and van Ginneken* 1987). Better educated women tended to have higher attendance rates in the child health programme. This is also true of most studies which show a correlation between maternal education and the use of preventive health services, and somewhat less often, the use of curative care services (*Cleland and van Ginneken* 1987). The reasons for these associations are not clear, but an intensive study of modernization and change in southern India found that educated mothers attached higher values to the health of children and transferred the explanation of illness and treatment from the religious to the secular sphere, becoming less fatalistic about disease (*Caldwell et al* 1983).

In a review of the associations between maternal education and infant and child mortality, Cleland and van Ginneken (1987) showed that maternal education still had a pronounced effect on mortality after accounting for higher socio-economic levels and greater use of modern health services. They postulated that changes in the domestic care of children were the key to increased survivorship. One of the effects of education was a greater willingness to try innovative ideas and to adopt behaviours which accord with modern ideas. Some evidence for this comes from a study in Bangladesh where educated mothers were found to place much greater emphasis on personal and domestic cleanliness than uneducated mothers (*Cleland and van Ginneken* 1987). Caldwell (1986) emphasized the greater autonomy of educated mothers in the family, which allowed her to make a faster and more appropriate response to a child's needs, although Cleland and van Ginneken (1987) point out that the effect of maternal education was equally strong in societies with a tradition of sexual equality as in strongly patriarchal societies.

In this study, higher attendance rates at the child health sessions were associated with higher maternal education and socio-economic levels and with tribe, but not with parity. One review of the factors which influence utilization of health care found that the structural characteristics of the health system, such as the number of doctors per capita, did not predict utilization of services as much as measures of consumer satisfaction with the convenience of the system: travel time and cost, waiting time, and the cost of services (*Anderson* 1983). Barriers of time and costs are frequently cited as constraining the use of health services, although a three-country study in the Middle East also noted that the lack of supplies and specialized facilities combined with poor professional behaviour on the part of health workers were also barriers to use (*Hassouna* 1983). The acceptability of services is also affected by clients' personal characteristics, such as their religion or tribal group, and by socio-psychological factors, such as perceptions of illness and motivation for seeking care (*Tanahashi* 1978, *Hielscher and Sommerfeld* 1985). The end-result of these factors can be seen in the quality of care provided and in the utilization of services. The quality of the service provided to the child was not analyzed by the mother's individual characteristics in this study, but it was probably affected in the way noted in several other studies, that better-educated mothers are able to demand and receive higher quality services, and are more likely to comply with advice and persist with treatment (*Caldwell and Caldwell* 1985, *Cleland and van Ginneken* 1987).

Parity was not significantly associated with attendance in this study. This was somewhat surprising, since the number of children a mother had could affect her motivation and ability to use child health services in a number of ways. A young mother with little experience of child illness might not use services due to a lack of awareness of the health needs of young children. Conversely, she might use the health services more frequently than a higher-parity mother to compensate for her lack of knowledge. A mother who had many children might feel experienced and secure enough to not feel the need for preventive health services, and she might feel more busy and economically pressured than a mother with only one child. Alternatively, she might have learned to believe in the value of health services if she had had good experiences with them. Unfortunately, no information was elicited in the study which would help to explain the lack of association which was observed.

8.3 Knowledge about Growth Charts

The ability of mothers to correctly interpret the weight line on the growth charts was most strongly associated with their educational level, although attendance also increased their ability. Most educated mothers had had only one to four years of schooling. By that level, they would have learned to read but not to have become familiar with the concept of graphs. Health workers claimed to believe that only literate mothers were capable of understanding charts, and probably therefore reinforced the differences between literate and illiterate mothers by explaining the chart only to literate mothers.

Lack of schooling was not an absolute bar to understanding the chart, as 76% of mothers with no schooling who answered the question were able to interpret their own child's growth chart. Whether some of these women were actually literate (a small adult literacy programme operated in the area) or whether they had learned from the health sessions or literate friends and relatives is not known. Recent research has shown that the relationship between knowledge, attitudes and behaviour is complex and rather than a knowledge-to-attitude-to-behaviour linkage which is usually presumed, an attitude-to-knowledge-to-behaviour linkage may be operative (*Gussow and Contento* 1984). If illiterate women did not believe they could understand the chart, they would be less inclined to try to learn from health workers and others and the health workers would be less inclined to teach them.

Mothers assessed their children's growth through behavioural signals, mainly in the form of a good appetite and lack of illness. Also important was the child's gain in weight, expressed in Swahili as an increase in the "kilos" of the child. The use of the word "kilos" in the answers, and probably the concept of weight gain, was reinforced by the widespread practice of calling child health sessions "kilos". Twenty percent of mothers also mentioned that the child was good-humoured and played actively when well. Similar ideas about growth were shown in a study in Ghana of mothers attending child health clinics as well as other groups in the community (*Lovel et al* 1984).

It does not appear that mothers relied upon, or even were very conscious of, receiving guidance from the growth chart about the state of their child's health, even though the chart was retained by the mothers. Only five per cent mentioned it as a way of knowing whether their child was growing well. In the Ghanaian study, 2% of mothers claimed to assess growth through weight gain as measured in the clinic, but the study did not report that any used the growth chart for this purpose. However, nearly half of the Ghanaian mothers said they referred to the chart at home and nearly two-thirds had discussed their child's growth chart with other people (*Lovel et al* 1984). The educational value of the chart was not exploited systematically by the health workers in three Zairian programmes observed in this study. The mothers' own ways of assessing their children's health were also not exploited, for example by connecting these ideas with the growth chart, by using them to increase the mothers' awareness of the signs and symptoms of illness, or to illustrate explanations about treatment.

Considerable interest in the outcome of the visits to the child health sessions was shown by the mothers' partners, 80% of whom were reported to look at the chart or ask about the result. This interest was not made use of by this programme, nor, probably, by the vast majority of other child health programmes. The audience for the health education messages and the services provided was exclusively mothers and children, even though it is frequently claimed that men wield the economic power in the family and the social, economic and political power in the life of the community (*Blair* 1982, *WHO* 1985).

8.4 Knowledge and Practices about Feeding of Young Children

In the questions concerning the feeding of young children, there was one question of knowledge and five about practices as reported by the mother. The knowledge question (what to feed a child who was not growing well) was most strongly affected by the mother's educational level, although attendance was still highly significant after controlling for education. Information on health subjects was not systematically taught in the schools, and educational level may have had its effect through the mechanism suggested by Cleland and van Ginneken (1987), that educated mothers were more likely to accept modern ideas on health.

The feeding of children was a frequent topic in the sessions, both in group health education and in individual counselling. Several groups of older people who were interviewed said that feeding practices had changed since the health service had begun, and that people now recognized that young children had to be given a variety of foods besides breast-milk. They and student nurses felt that there were now no taboos on foods for young children, whereas some foods eg. eggs, used to be proscribed. They also said there was now less malnutrition as a result. This may indeed be true, or it may be that these groups had accepted the common view of Western-oriented nutrition education that traditional diets for weanlings are inadequate, whether that was true or not (*Wilson* 1985).

Diets were quite monotonous; the three meals usually consisted of a staple food and cassava leaves for two meals and a staple food plus beans for the third meal. Such a diet would receive a score of seven points using the system described in 7.4.5. This accords well with the results shown in Table 7.6 where 77% of the children had eaten three times on the previous day and 65% received a score of eight points or less. Palm oil or butter was often used in cooking food, but information on the amount of fat used was not collected. Fruit was not mentioned when the mothers listed the foods eaten by the child on the previous day. It is not possible to be precise about the adequacy of the children's diets using the data collected, although it would appear that children could be nourished adequately on the typical diets of the area, provided the relative amounts of different foods were properly balanced.

No mention was made in the child health sessions of the need of children for adequate amounts of fat, nor about making food more palatable by using less pepper in cooking. Health workers told mothers about the need to give children a variety of food simply by listing examples of different types of food; they did not teach the classification of food into the three food groups, which is done in many programmes and which is probably not relevant to most indigenous concepts of diet (*Gussow and Contento* 1984).

Ideas on how to deal with anorexia were not discussed at the child health sessions. The idea that ill and anorexic children needed to be fed more frequently than usual, or should consume more total calories than usual after an illness, were not taught in the sessions, and were not mentioned by mothers. Health workers said it was difficult for mothers to feed children more than three times a day, implying that this was why they did not offer this advice. The difficulty for mothers in this society of giving children even three meals a day is reflected by the results in Table 7.5, where a considerable number of mothers had not actually managed to feed their child as often as they said was desirable for a child of that age. The heavy workload of women which kept them working for long periods away from the house, and the laborious nature of food processing and preparation, were probably the main reasons for infrequent feeding, along with the cultural unacceptability of food preparation by men.

Most mothers offered a variety of foods to children from a young age, as taught in the child health programme. The exact age which is most advisable for the introduction of solid food is debated, as the calories ingested in weaning foods may be accompanied by large quantities of bacteria and reduce the amount of breast-milk ingested (*Martorell and Ho* 1984). Another consideration in advising the start or delay of solid food is the mother's ability to breast-feed on demand as the baby gets older and the mother returns to agricultural work. In this programme, health workers were taught to instruct mothers to start giving porridge when the child was three months of age, in line with modern nutrition teaching rather than as a result of intimate knowledge of local family food ecology. The health workers knew that cow's milk was commonly given to children from a very young age (sometimes but not always boiled) and did not have any strong views on the advisability of this practice. They thought that it did not reduce breast-feeding, and that cow's milk was easily digested by even very young babies, and would in fact be an advantage when the mother's breast milk was "spoiled". It was commonly believed, including by student nurses, that if mothers stayed too long in the sun their breast milk would give the child diarrhoea. This belief is found in many societies (*International Nutrition Communications Services*, undated). None of these erroneous beliefs were addressed by the programme.

Socio-economic level had an effect on the mother's practices relating to the introduction of all recommended foods by the time the child was nine months old, but in the direction opposite to that expected. Overall, the more expensive foods (beans, meat, fish) were least often given to children before nine months, but it was the mothers in the lowest socio-economic strata who tended to give all solid foods earlier. This may be partially explained by results shown in Table 7.4, where the proportion of Wahema mothers who followed this practice was the lowest of the three tribes. The Wahema households tended to be in the higher socio-economic strata. Also, more of the Wahema grew staple crops only, as they depended on their cattle for part of their food, so many would have had to buy beans in the market. They also did not eat meat frequently, utilizing instead the milk and blood of the cattle. Cow's milk was considered an excellent food for children and was given to them within the first few weeks of life, although breastfeeding alone is known to be the best source of nourishment for infants up to the age of two months, and possibly up to the age of six months (*Waterlow et al* 1980).

Tribal affiliation was the most important influence on four of the five questions on reported feeding practices. The Wahema were least likely to introduce all solid foods before the age of nine months, but were more likely to say that young children should eat three or more times a day, and to have fed the index child more often with higher-quality food on the day previous to the interview. The Wangiti appeared to have given children the lowest-quality food and to have fed their children the least number of times on the previous day. It is not certain that the more frequent feeding and higher quality food noted for the one day reported on was typical of feeding patterns in the Wahema and actually resulted in substantially better food intake, although the lower prevalence of stunting in Wahema children suggests that it did.

The importance of tribal affiliation in determining food habits is not surprising. The tribe is a cultural entity with specific beliefs, values and behaviours into which members are socialized and thereby become distinct from other groups. Numerous studies have shown that patterns of diet, disease and health behaviours are related to cultural sets of normative beliefs and behaviours (*Mosley* 1985, *Nations* 1985, *Heggenhougen and Shore* 1986). Food habits are particularly strongly related to culture and all known societies have enforced cultural patterns of eating with heavy sanctions (*Gussow and Contento* 1984). Traditional food patterns have begun to be modified in most societies. Whether tribal influence in this area had acted to maintain or change habits of feeding of young children is not clear, although local informants said that habits had changed.

This pattern of feeding was partly due to the availability of food, to what the family produced rather than purchased.

The Wahema had greater access to milk and milk products from their cattle and the Wangiti to a greater variety of agricultural products from their farms. As milk was considered a high quality food for children, the Wahema may not have perceived the need to buy vegetables and fruit to add to their children's diet. Conversely, milk was relatively expensive and not frequently purchased by the Wangiti, though their children ate more vegetables, including beans.

Socio-economic level was an important influence on feeding knowledge and practices in addition to tribe, as shown in the logisitic regression results. People in the lowest socio-economic group tended to receive the lowest composite scores for feeding. The regression analysis also showed that the number of times a child had been weighed had a marked effect on improving feeding knowledge and practices (Table 7.9). It appears that the programme had not completely overcome the influences of tribe and poverty in the feeding of children, although it may have generally improved feeding habits among all tribal and socio-economic groups since it started. However, there was no reliable baseline information with which to make a comparison.

8.5 Knowledge and Practices Concerning Diarrhoea

One question on the causes of diarrhoea and two questions on reported treatment practices were asked. The word "diarrhoea" was not defined to mothers. Local informants said only one word which meant diarrhoea was in common use in Swahili and the two local languages. The term "cholera" was known to some people, but it was not felt necessary to distinguish between it and diarrhoea since no cholera had been seen by the health service in recent years and it was assumed not to be a common problem. Mothers may have had different ideas on the amounts and frequencies of watery stool which they termed diarrhoea and their treatments may have varied by the perceived severity or cause. However, from interviews with local informants, there did not appear to be a complex local system for classifying diarrhoea by different symptoms and causes such as was found by Chowdhury in Bangladesh (1986).

The mothers appeared to have acquired information about diarrhoea by attending the sessions, although educational level was an important factor as well. Much emphasis was given to the subject of the causes of diarrhoea in the health education sessions. Mothers were able to recite the names of worms which they had been told caused diarrhoea ("taenia", "ascaris"); accordingly, many gave anthelminthics to children with diarrhoea. Although there is no evidence that worms are a cause of diarrhoea (*Davey and Wilson* 1965), mothers easily recognized worms and were concerned about them, so that health workers thought it beneficial to associate the idea of diarrhoea with worms in order to encourage mothers to follow their teachings on hygiene.

Wahema mothers received a significantly higher score for the question on the causes of diarrhoea than mothers from the other two tribal groups. This may be a reflection both of their higher education levels and of their greater awareness of children's exposure to animal faeces in their environment. Mothers had also learned information on the need to rehydrate children with oral rehydration solution from the programme. The causes of diarrhoea were discussed extensively and only a few minutes were devoted to telling the mothers how to prepare a rehydration solution in the four health education talks observed where this subject was taught. No details were given on the indications for its use and the dose. Demonstrations of how to make a home-made sugar-salt solution were rarely given, according to the programme supervisors. Two demonstrations were given at the author's request, and the VHWs who did the demonstrations had first to be shown how to mix the solution. Although they had been taught this in their initial training, they had apparently not subsequently taught the subject themselves, and consequently had forgotten how to do it.

The survey results showed that treatment practices were affected by socio-economic, educational and attendance levels. Overall, the number of women who knew how to mix a solution of ORS was low, with only 26% being able to state the correct proportions of ingredients. When asked what they did the last time their child had diarrhoea, about half of mothers reported boiling water to which they added sugar and salt. When Lechtig et al (1983) asked the same question in a Guatemalan study, the reported use rate of ORS was 40%.

In a study in Bangladesh, Chowdhury (1986) found that 4-26% of solutions mixed by mothers had dangerously high amounts of salt which could lead to hypernatraemia. Mothers confused the instructions to use a "pinch of salt and a fistful of sugar", rather than the amount of water to use. In the Boga study, 38% of mothers made the solution by the glassful, probably producing a solution with very high concentrations of salt. Of those who said they prepared it by the litre, ten times as many women used too little sugar as used as used too little salt, and only two women used too much salt. Sugar was sometimes difficult to find on the market and was relatively expensive and this was probably the reason for the association of ORS use with a higher socio-economic level and for the fact that many mothers prepared the solution by the glassful. Another difficulty with the preparation of home-based ORS was the variety in the size of spoons commonly used in the area. It should be noted that correct mixing of the solution does not necessarily imply it was given in the correct dosage for all episodes indicated.

Only 16 women mentioned using packaged ORS, which cost five zaires (£0.07) per packet. Since most bouts of diarrhoea would require two packets, many mothers from this poor community might have felt that this expense was not justified for a common childhood illness which occurred on several occasions each year and was usually not life-threatening.

The programme did not teach mothers how to prepare ORS very frequently in the child health sessions and usually taught it by lecture rather than demonstration. Alternatives such as rice-water solution were not taught, although rice was widely available. The programme had no information on other alternatives, such as making a solution from cassava or sweet potatoes. The supervisors were not enthusiastic about teaching mothers about ORS, and did it on the two occasions when it was observed only to comply with the author's request. They said that mothers found it difficult to obtain sugar and implied that teaching about ORS was not a productive activity. A similar finding was reported from Indonesia, where the evaluators found that the solution was not fully accepted by health workers or local people, and quoted surveys which showed that only 30-50% of mothers had heard about ORS and only about 15% had ever used it (*Chowdhury* 1986).

8.6 Anthropometric Status

The prevalence of stunting was much higher than the prevalence of wasting in this population, indicating that most of the deficit in weight-for-age was a result of stunting in children rather than wasting. Few children were suffering from severe acute malnutrition and in need of urgent treatment by the health service.

Although frequent attendance at child health sessions did have a positive effect on the knowledge and practices of mothers, it was not sufficient to counteract the effects on growth of many other factors in the child's environment, which were represented in this study only by a measure of the socio-economic level and by the tribe. In an urban study in The Gambia, Tomkins (1988) showed that stunting was associated with prolonged duration of diarrhoea, and with poor housing, inadequate water supply and sanitation,a low maternal education, and poverty leading to poor access to food and health care. The association found between stunting and prolonged duration of diarrhoea was thought to be partly due to delays in seeking therapy. The Boga survey showed no significant association between mother's educational level and stunting, but socio-economic level was associated with stunting, and tribe even more strongly so. Considerably more Wangiti children than Wahema children were stunted, with the rate among "Other" children being between these two.

There were two probable reasons for the differences in growth pattern between the tribes, namely ethnicity and socio-economic factors. The Wahema are a Nilotic tribe, an ethnic group which is considered to be taller on average than some other ethnic groups. However, most studies have shown that socio-economic factors are more important than genetic factors in determining growth and a genetic tendency to greater stature was not expressed in poor socio-economic environments (*Martorell* 1985). Although most people in this area were poor, the Wahema were relatively better-off than the other tribes.

The differences in wasting and stunting between the tribes were striking. The Wahema had the highest prevalence of wasting and the lowest prevalence of stunting, while the opposite was true for the Wangiti. Stunting was highest in older children. Although prevalence differences could therefore have been, in theory, due to there being different proportions of children in different age-groups in the three tribes, these proportions were actually similar in each of the three tribes.

An alternative explanation for this pattern of wasting and stunting might be the following. Wasting is frequently the result of an acute illness, especially diarrhoea. The Wahema children were brought up with large numbers of goats and cattle in their immediate environment. Hence, they may have had a higher incidence of diarrhoea because of the greater faecal contamination of their environment, leading to more acute weight loss. On the other hand, their families were economically better-off, and milk and butter formed a larger part of their diet than for the other tribes. Their greater access to higher quality food might have allowed greater catch-up growth after infections, which might explain the lower prevalence of stunting. Also Wahema mothers did not farm as extensively as Wangiti mothers, so that they may have been able to spend more time at home and feed children, especially convalescent ones, more frequently. No figures were collected on the incidence or prevalence of diarrhoea in the survey, but only Wahema families reported feeding their children butter and Table 7.6 shows that Wahema children ate higher-quality food and also ate more frequently on the day previous to the survey.

The effect of stunting on child mortality in this area can only be guessed at. Other studies have shown that populations with chronically deficient diets may have severe stunting but low mortality if the environment and medical services are good, as in Kerala and Chile (*Mosley* 1985). However, even if food shortages are not common, wasting and stunting may be associated with high mortality if poor environmental conditions lead to frequent diarrhoeal and respiratory infections, as shown in Costa Rica and Guatemala (*Mata* 1983).

8.7 Conclusion

The topics most frequently taught in the child health sessions had been well learned by mothers, especially by those with higher attendance rates. The educational level of the mothers strongly influenced their ability to answer most questions correctly, although attendance rate still had an effect after controlling for education and other confounding factors. The main exception was child feeding practices, which were most strongly influenced by tribal affiliation. The survey showed that mothers of one tribe, the Wahema, were significantly more likely than the other tribes to have higher educational and socio-economic levels. They attended child health sessions more frequently and their children had lower prevalence rates of stunting than children of the other two tribes. However, it could not be claimed from these results that more frequent attendance at the child health sessions contributed to lower rates of stunting, since results of the anthropometric measurements were confounded by the children's age. It is probable that the more favourable socio-economic circumstances of these children and their mother's better education had as strong or stronger influence on their growth.

CHAPTER 9

CONCLUSIONS AND RECOMMENDATIONS

9.1 Issues in Growth Monitoring

Malnutrition is widespread in children under five in developing countries and although there is some controversy as to the significance of growth retardation, there is general agreement that growth is "perhaps the...best bioassay of health" (*Tomkins* 1988, p.199). Proceeding from the viewpoint that growth patterns which are similar to those of children in developed countries indicate a lowered likelihood of morbidity and mortality, the promotion of healthy growth is the objective of growth monitoring activities as advocated by a number of authors and agencies (*Morley and Woodland* 1979, *Rohde* 1985, *Grant* 1987). In the 20 years that growth monitoring has been widely implemented, a great deal of experience has been gained, although most of the written information available is from Asian programmes and mainly anecdotal information is available from African programmes.

Very little research has been done on growth monitoring per se, aside from the exploration of the associations between anthropometry and morbidity and mortality. Most research has focussed on the impact of health and nutrition interventions, some of the research having succeeded in studying the separate effects of different components. However, none was found which assessed the separate contribution of growth monitoring to the effectiveness of health and nutrition interventions, whether through improving the responses of health personnel to at-risk children, or through improving the knowledge, attitudes and behaviour of mothers. No information was found on the effect of introducing growth monitoring into child health programmes on the quantity and quality of the other activities of health workers.

Much of the discussion of growth monitoring has centred on the often poor implementation of child health programmes, in which excessive attention is paid to weighing children to the neglect of meaningful actions to promote growth. Some critiques have focussed on a more basic question of the rationale of growth monitoring, whether used as a strategy for screening children at-risk, or as a strategy to promote the involvement of the community in improving the health of children.

The use of growth monitoring as a screening mechanism to increase the efficiency of the health service appears to have few benefits in view of the low sensitivity of anthropometry at reasonable levels of specificity to predict mortality, the generally low and non-representative coverage of programmes, and the high rates of growth faltering in children under three years of age. As a means to educate mothers and communities and increase their involvement in health care, the monitoring of children's growth is only one of a number of critical factors which must act in concert to achieve these aims. Not surprisingly, growth monitoring does not appear to be effective in the absence of adequate training, supervision, and logistical and financial support, and the existence of those factors which enable individuals and communities to respond to programme initiatives.

9.2 The Methodology of the Study

The main concern of health service evaluation research is to assess the effects of programmes and the processes that produce those effects. Results from studies of specific programmes can be generalized to broad sectoral issues. In this study some aspects of the implementation of growth monitoring in three programmes were examined and compared with observations from other studies found in the literature. Recommendations for the three programmes studied and for growth monitoring in general could be formulated.

The programmes chosen for study were typical of many non-governmental programmes seen in developing countries. They showed the potentials of growth monitoring in programmes with advantages not always found in government systems, such as an assured supply of resources and a more flexible administrative context. Two programmes (Kasongo and Katana) had the benefit of a long-standing presence in the area and familiarity with the population, as well as several physicians with research expertise. However, two programmes (Boga and Kasongo) were run on budgets which would be compatible with most governments' resource levels, and the Boga programme had the modest level of staffing and organizational sophistication more typical of routine government programmes.

The first part of this study utilized the observations made at child health sessions to assess how growth monitoring was used in the delivery of health care. Information was gathered on the characteristics of the services offered to mothers and children: on the interventions available and their implementation, the apparent appropriateness of the interventions to the children's needs, and the training, expertise and supervision of the personnel. This was done to avoid a problem seen in many evaluations of health programmes which focus only on outcome and impact measurements: the factors producing the measured results remain obscure because of inadequate information about programme efforts, on what Quay (1979) has called the "strength and integrity" of the interventions. Some of the institutional factors responsible for determining programme performance were assessed, mainly the supervision and training of health workers, while the political and administrative context of the programmes was not analyzed in detail (*Mosley* 1985, *Simmons et al* 1986).

The community survey conducted in the Boga programme area was a second, complementary way of evaluating growth monitoring in a child health programme. It was used to assess the mothers' knowledge and practices concerning information taught in the programme and the anthropometric status of her children under five. These outcomes were considered to be a result of the interrelationships between the implementation of the programme and the socio-economic and cultural circumstances of the mothers and children (*Simmons et al* 1986). The community survey suffered from problems of a slightly inaccurate census as well as unsatisfactory equipment for measuring height. However, the population studied could be considered representative of the area and the response of mothers to the interview was good. There may be questions as to whether the reported practices of mothers were their actual practices, but the fact that many mothers reported feeding their children less often than they said was ideal practice indicates that they tended to state their actual practices at least some of the time.

9.3 Conclusions from Observations of Child Health Sessions

Activities at sessions were well organized in that all the activities planned for the sessions were carried out, mothers were cooperative in forming orderly groups or queues and following all the activities, and the noise and fatigue for all involved were kept to the minimum possible. However, waiting times could be very long, the children were not always cared for by the most appropriately-qualified staff member and mothers were treated as passive recipients of services. The quality of the contacts between health workers and mothers varied, both in the nature of the interpersonal relations and the technical competence with which the workers performed their duties. The focus of this study was on technical competence, while recognizing that the effectiveness of treatment may partly derive from the manner of delivery (*Rossi* 1979). The interest of the programme managers in the child health sessions and the problems posed by growth faltering affected the amount of time they devoted to planning the programme and training and supervising workers in carrying out child health activities. Finally, their interest appeared to have a positive effect on the quality of the work performed.

Weighing and plotting of weights were generally well-done in the three programmes studied, and most of the faults could easily be reduced by simple training and continued supervision. Growth information was used by health workers along with other diagnostic information to decide on interventions, but the interpretation of the weight trend was incorrect in one-third of cases, probably due both to the lack of appreciation of health workers of its significance, as well as to the pressured pace of work in sessions with large numbers of children. Counselling of the mothers, with some notable exceptions, had most of the deficiencies described in the literature (standardized, non-specific, directive, inadequate with regard to the care of ill children) (*Reid* 1984, *Alnwick* 1985). The written guidelines available to health workers on what to do in the case of growth faltering were non-existent, unusable or inadequate.

The separation of preventive from curative care meant that ill children, who made up a large proportion of children with growth faltering at the sessions, could not be treated during sessions but were referred for curative care, thereby reducing the likelihood of their receiving treatment. However, the availability of immunizations and ante-natal care at the sessions probably increased the utilization of these services. As is usually the case, the child health activities had been planned and organized by the health service without direct consultation of mothers and communities as to what activities they would like to see in the programme and how they wanted them organized.

The programmes were health service-organized and run, having little contact with other development activities and little involvement of the communities except for using local people as extenders of services for technically simple tasks. This had two main consequences. First, the programme had to manage very large numbers of children with few qualified staff, and this affected the quality of treatment and counselling given at the sessions. It restricted coverage, as health workers had little or no time to seek out high-risk children in the communities who did not attend the sessions. Nor did they have time to actively follow-up malnourished or very ill children seen at the sessions. There was also little possibility to widen the scope of activities beyond the curative and preventive health services already offered. This led to the second main effect, that some of the more complex social reasons for malnutrition could not be satisfactorily dealt with. All three physicians in charge of the programmes expressed their frustration with seemingly intractable cases of malnutrition. Without the community's understanding of the issues involved and their willingness to participate in remedial actions, a substantial improvement in the quality of the services offered at the sessions was beyond the resources of the health service, not to mention the possibility of wider health-promoting activities.

9.4 Conclusions from the Community Survey in the Boga Programme Area

In common with results from many other studies, the mothers in this survey who had most often attended child health sessions tended to be better-educated and economically better-off than mothers who attended less frequently (*Cleland and van Ginneken* 1987). The three major influences on the knowledge and practices of mothers appeared to be the mother's tribe, educational level and attendance rate. Socio-economic level was less important over-all and parity least important.

The total score received by mothers for answers to all twelve questions was most strongly related to educational level, although attendance was still significantly associated with the total score after controlling for educational level (Table 7.3). Attendance at child health sessions improved mothers' knowledge about growth charts, causes of diarrhoea and feeding of malnourished children, although educational level was also an important influence in all of these questions. For feeding practices, tribe and socio-economic level were the most important factors. Attendance at child health sessions did not appear to have altered appreciably the frequency and type of food children 18-36 months of age were fed or the age of introduction of solid foods. Socio-economic level also had an effect on the use of ORS, probably because of the high cost of sugar. The supervisors did not promote the use of ORS enthusiastically, and the overall use rate was low. In summary, it could not be claimed from these results that the mothers' knowing their child's weight trend through reading the growth chart improved their knowledge and practices in child care. Understanding the growth chart may have acted as an incentive to increase attendance and thereby improve knowledge and practices, but there was no way to ascertain whether such an effect actually occurred.

Malnutrition in children was expressed mainly as a linear growth deficit, detectable at high prevalence levels even below the age of six months. Wasting had a low prevalence. Stunting was related both to the child's tribe and socio-economic level. The poorest feeding patterns and highest rates of stunting were found in the Wangiti, the tribe with the lowest levels of maternal education and socio-economic status. It was not possible to determine conclusively if attendance at the child health sessions affected the probability of stunting, as results were confounded by differences in children's ages.

9.5 Recommendations to the Child Health Programmes

9.5.1 *Recommendations to the three programmes*

These general recommendations apply in different degrees to each of the three programmes and need to be interpreted in light of what has occurred in the programmes in the intervening year between data collection and completion of this thesis. Also the political, cultural and institutional context of the programmes and the communities in which they operate will make some of the recommendations more suitable to some programmes than others (*Heggenhougen and Shore* 1986, *Rifkin and Walt* 1986).

1. The programme managers should discuss the findings from this study with all the staff involved in the child health programme, focussing on the fundamental question of whether growth monitoring should be used mainly as a diagnostic and screening tool for the health workers' use, as is now the case, or whether the emphasis should shift to using growth monitoring as a tool to educate and motivate the mothers and communities. Possible solutions to the problems described and subsequent training programmes which would improve the implementation of the activities should then be discussed. All the staff should be involved in deciding what the health service, along with mothers and community groups, can do for children with growth faltering, including those with difficult problems, such as prolonged growth faltering or severe malnutrition. The actions should include care at three levels: in the home, health centre and hospital. A well-informed debate on the technologies available, the effectiveness and organizational feasibility of different strategies of delivery, the costs involved, and the desires and resources of the population would provide a firm basis for deciding on the approaches to be taken to the poor

health of children (*Mills* 1983, *Heggenhougen and Shore* 1986).

2. Based on these discussions, the programmes should prepare clear written guidelines on what health workers should do at child health sessions for children with growth faltering, including criteria for defining growth faltering, physical examinations which should be carried out, questions to ask the mother or guardian, actions to undertake and advice to give the mother or guardian, and criteria for referral to the health centre, hospital or nutrition rehabilitation programme.

Such guidelines would be especially useful for the less-qualified and experienced staff. They should be written so as to make counselling more specific, and should put some emphasis on the feeding of children during and after illness as well as on the medical treatment of illness. Counselling should be more interactive, and does not always need to be one-to-one, but could be carried out with small groups of mothers with a common problem, such as a child with diarrhoea. Drugs for common illnesses should be available at sessions if the mothers want them and are willing to pay for them, and if the re-organization of sessions allows for the dispensing of medicine.

3. If the programmes are kept in basically the same format, they could improve their efficiency and the quality of care given to the most at-risk children by instituting a system of triage, as described in Section 7.5.3 and Appendix E.

4. The subjects taught at group health education should be repeated for two months in a row in order to reinforce the mothers' learning. (This suggestion came from several groups of mothers). Topics should be widened to include subjects suggested by mothers. Health workers should be taught to use participatory teaching techniques suitable for adult learners. This would have the potential at least of eliciting solutions from the communities and mothers themselves for problems for which the health workers had no solutions, including the non-compliance of mothers with certain types of advice, such as feeding children more frequently or spacing births by the use of contraception.

5. The staff in charge of the sessions should be encouraged to spend some of their time during the sessions in teaching and supervising the other staff.

6. Growth charts should be kept by mothers, unless it is foreseen that the information on the charts will be needed for research and there will be no possibility of obtaining the charts except by keeping them at the health centres. This would reduce the considerable cost, time and effort devoted to finding and re-filing charts, transporting them to mobile sessions, and preparing reports on the sessions from the charts at the end of the sessions. A system to record information during the sessions would need to be developed, perhaps similar to the one used in Boga (see Section 9.5.2 Recommendation 2).

The growth charts retained by the mothers should be used by the health workers as a health record for the child ie. diagnosis, treatments and referrals should be recorded. If the charts were printed in Swahili or another local language, they would be more useful as an educational tool. Health workers should learn to fill in and use the section of the chart on "reasons for special care", unless this information is considered potentially embarrassing to the parents, in which case it could be recorded in the health centre's records. In order to realize the potential benefits of the growth charts, staff should also teach mothers to interpret the weight trend as a start to educating mothers and involving them more fully in their children's care.

7. Programme managers need to pay consistent attention to problems and achievements in the child health programme, in order to keep the staff interested and motivated, especially those staff whose job is limited to working at child health sessions and for whom decreasing job satisfaction and performance is a danger. For monitoring the programme, the managers should decide what regular information would be most useful for themselves and for the workers at the sessions. Some suggestions are listed in Recommendation 8.

8. Health workers should learn to monitor the child health programme in order to evaluate their performance. They could also use this information to teach mothers and communities about their children's health problems and the care they are receiving. Examples of information that could be prepared

at the end of each session or month are:

- the number of children registered vs. the target number in the catchment area,

- the number of children attending vs. the target number and the number registered,

- the number who gained weight vs. the number who attended,

- the number of children who received immunizations and treatment for illness,

- the number of children who have not gained weight for more than two consecutive months,

- the number of children referred for treatment, and

- the number of children who had reached a target weight at 36 months of age.

Information would be more understandable and visually interesting for health workers, mothers and communities if it were displayed graphically.

9. The programmes should target children for regular monitoring only up to the age of three years, unless a child's poor physical condition or social circumstances warranted an exception.

10. Instead of health staff weighing children, other options which could be considered by the health workers and discussed with the mothers are:

- to have mothers or other volunteers from the community weigh children and chart their weights,

- to screen children by arm circumference instead of weighing,

- to not screen children by anthropometric measurement but consider all children under three as at-risk.

If child health sessions are initiated in new parts of the catchment areas, these options could be tested and compared to existing methods of carrying out sessions.

11. The programmes should consider whether the problem of selective coverage, whereby higher-risk children are not adequately covered, warrants more attention. Some options to reach higher-risk children would be:

- to use other community members to encourage attendance,
- to use socio-economic criteria to choose children for home visits, and perhaps weigh them or measure their arm circumference in the home,
- to accept the registration fee in instalments if the cost of registration is a barrier to attendance.

12. More emphasis needs to be put on involving mothers and community members, especially fathers, in the work at the sessions as well as in wider health actions aimed at the health problems of children and the community. As Rutabanzibwa-Ngaiza (1985, p.39) noted, the maternal and child health literature reveals a "total absence of dialogue with women" in the development of services targeted at them. Women's involvement usually begins after the service has been set up and basically consists of their passive acceptance of services or upkeep of facilities. Community consultation takes place (when it does at all) with men. The problem of too many children to be seen by two few health workers can only be solved by hiring more health workers or putting more of the work in the hands of the community. The former option could threaten the financial viability of the programmes, while the latter option has the advantage of educating and involving the community.

Fathers in Boga (*Nickson* 1988) and some health committee members in Kasongo specifically stated they would like to be involved in the child health sessions. Since many studies indicate that women in Africa are over-burdened with work and have limited scope for increasing the time spent on child care, and as fathers are believed to control much of the economic and decision-making power in the family, it seems logical to include fathers in efforts to improve children's health (*WHO* 1985). For the involvement of the community, the assistance and good will of some village and health committees might be further exploited. The initiatives seen in Kasongo (the "wise mothers", the nutrition study group, and teaching nurses participatory education techniques) are a promising direction to pursue.

13. The health service should complement and reinforce its efforts to improve child health by involving other sectors in the child health sessions and other health activities. The complex nature of the influences on childhood malnutrition, morbidity and mortality require that child health programmes should not confine their efforts to the usual curative and preventive services, but should try to affect as many other influences as possible either directly or indirectly through other actors (*Unger and Killingsworth* 1986). The health and nutrition of children are indivisible from the health and nutrition of the whole family, and in poor communities especially, an improvement in the diet of the whole family is the best way to improve the diet of the young child (*Gopalan* 1980).

Insufficient information was gathered to allow the formulation of specific examples for all three programmes. One example would be to have the agricultural advisor in Boga promote the cultivation of soya beans through the child health programme. Instead of visiting individual households, he could reach a large number of farmers at one time by attending child health sessions to offer samples of seed to plant or samples of cooked beans for the mothers and children to taste. Some mothers could be asked to take home some beans and prepare them, and report back at the next session on their experiences in cooking them and the acceptability to the family.

14. In all three programmes, all of the nurses involved in the child health programmes were male, and the majority of the auxiliary workers and VHWs were male. It was claimed that program managers have found continual difficulties with training and employing female staff because women frequently leave work for reasons of marriage, childbirth and financial constraints whereby it becomes necessary for the wife to farm if the husband has a low-salaried job. While these personnel problems are important, such discrimination in favour of hiring males does not help to advance the social, economic and educational position of women, seen as key to the improvement of child health and the development of society (*Gopalan* 1980, *WHO* 1985). It was claimed by local informants that having male staff was not a barrier to effectiveness even in programmes dealing mainly with women and children, but it is likely that men would not appreciate the pressures and constraints of managing child care along

with other women's duties to the extent that female staff would. This study could not assess these issues explicitly, nevertheless it is recommended that the programmes make strong efforts to train and employ women, especially older, married, respected women, for the child health programmes.

9.5.2 *Specific recommendations to the Boga programme*

1. In view of the high costs of operating the Land-Rover (Section 5.9), its use should be reduced to the minimum possible and more use made of the motorcycle. This would be possible for all sessions except a few which are distant from Boga.

2. The programme should standardize the growth chart used to the Zaire chart rather than the Road-to-Health chart. The records kept during the sessions could be adapted to provide more specific information. For example, instead of just putting a tick beside a child's name each month to indicate its presence at the session, the worker could put arrows indicating the direction of weight, and could write "s.c." for "sour-courbe" (to indicate the child is below the lowest reference line) and similar abbreviations to indicate referral to the different parts of the system. For children 36 months of age, their weight could be recorded and their registration terminated. This would not take any more space than the present system, but would allow

the information described in Section 9.4.1 Recommendation 8 to be recorded.

3. In addition to implementing the recommendation on health education which applies to all three programmes, the Boga programme should use the results from the community survey to decide on the topics for group health education. The survey showed that mothers have learned certain information well eg. the age of introduction of food to infants, giving a variety of food, and the causes of diarrhoea (Section 7.4). Less emphasis could be put on these topics to allow time for other subjects. For example, it was found that the use of worm medicine and enemas to treat diarrhoea and anorexia was widespread, that few mothers knew how to prepare ORS, and only some could understand the weight line on charts. As well, it was known that certain erroneous beliefs were widespread, such as that breast milk was "spoiled" if the mother spent too long in the sun and should not be given to the child, or that children could grow "plastic teeth" which had to be excised by traditional practitioners. All of these subjects should be part of the health education in the sessions; most would be more suitable for discussion than as a lecture and the health workers would need training in this.

4. The programme should try to find out through group discussions at child health sessions or interviews with individual women and VHWs why women do not use packaged ORS and why they prepare sugar-salt solutions by the glassful. Using the results of these enquiries, the programme should

decide what to advise mothers for treating diarrhoea: whether to reinforce the correct use of packaged ORS or sugar-salt solutions, or to teach alternatives such as solutions based on rice-water, other starchy foods, or indigenous recipes. A concerted effort should then be made by nurses, supervisors and VHWs to teach mothers using participatory methods.

5. People of the Wangiti and "Other" tribes appear to have the lowest educational and socio-economic levels, and the highest rates of stunting in children. Priority emphasis should be given to training VHWs for their villages, increasing their utilization of services, improving their economic base and increasing their involvement in their own health care.

6. The supervisors should prepare monthly work plans, for review by the programme manager, outlining health education plans for the sessions (including both topics and methods of teaching) and the plans for teaching VHWs to carry these out. During child health sessions, they should systematically assign children who need home visits to VHWs and should request verbal reports from the VHWs about the results of the visits. They should also give information on children needing follow-up to the appropriate health centre staff, who should liaise with the VHW if there is one, or carry out the home visits themselves if there is no VHW.

7. In order to improve the motivation and performance of health workers involved in child health sessions, the programme manager should supervise child health sessions

from time to time, observing the activities of all the workers and discussing the observations with them at the end of the session.

8. Ill children should be treated more vigorously with medicines at the sessions, and the mothers should be allowed to pay for the medicines at the next session, if they have brought insufficient money.

9. Health centre staff and student nurses should be encouraged to do more home visiting, as their work-schedule would accommodate this. One of the targets for home visiting should be children under three, for reasons of non-attendance at child health sessions, malnutrition, and follow-up to medical care. The VHWs should be given more training in the management of malnutrition, as all claimed they had seen children with kwashiorkor or severe marasmus in families who would not go to the health centre or hospital for financial or other reasons. There should be more regular communication between the VHWs and the health centre staff to allow the sharing of information and co-operation in the work of home visiting.

9. Ill children presenting in the hospital and health centres should be weighed and the information recorded on their growth chart. The care given to children with malnutrition or weight loss accompanying illness needs to be systematized and put into guidelines. It should include surveillance of the weight, appetite, and behaviour of the child, the mother's comprehension of and cooperation with

teaching, and if necessary, institutional feeding of the child. There should be organized teaching of and discussions with parents of in-patient children. The care could include home visits after discharge, especially since their length of stay in hospital may sometimes be determined more by financial than medical considerations.

9.5.3 *Specific recommendations to the Kasongo programme*

1. The auxiliary workers who do consultations during the child health sessions should receive formal training in the conduct of the sessions and the use of the written protocol, as well as ongoing supervision by the nurses. They also need training to improve their ability to conduct the nutrition rehabilitation programme.

2. The algorithms used by nurses for the treatment of illness in children should include instructions for the nutritional aspects of care during the acute and convalescent stages of illness.

3. The programme has the capability to carry out operational research on alternative ways to conduct child health sessions. With the agreement of the health staff and the communities, different options should be tried and evaluated, focussing on the determinants and consequences of programme performance, the major patterns of staff behaviour, the dynamics within the population affected by the programmes, the outcomes, and the costs.

4. The programme should carry out a study of the reasons for the low attendance at child health sessions in the rural

areas. Distance is no doubt an important reason (*Van Lerberghe and Pangu* 1988), but if after accounting for this factor there is still a high rate of irregular or non-attendance, the other reasons should be elicited in an effort to improve coverage.

5. The supervisors should supervise the child health programme more frequently and systematically, based on the written protocol and on other relevant initiatives of the service, such as the teaching of nurses in participatory teaching techniques.

9.5.4 *Specific recommendations to the Katana programme*

1. Since low birth weights and malnutrition in women are particularly important problems in this area, efforts to improve the nutrition of women and their ability to breast-feed adequately are especially important in improving the health of children. Most of the approaches would be found outside the health sector and cooperation with other sectors should be a priority. However the interventions by the health service which demand more time and resources from women for child care should be carefully assessed in terms of the costs to the mothers and benefits to the child. The health service should promote the cause of women's welfare amongst the other development agencies in the area by providing information on women's health status, as well as providing practical help to these agencies to improve the health of women whenever possible.

2. Like Kasongo, this programme has the capability to carry out operational research on alternative ways to conduct child health sessions. The programme should consider doing such research, as described in the third recommendation for the Kasongo programme.

9.6 Conclusions and Recommendations for Growth Monitoring in General

After reviewing the literature on growth monitoring and the results of this study, several conclusions as well as important gaps in information become apparent. As a means of increasing the efficiency of health services by targeting interventions, growth monitoring combined with skilled questioning and examination could, in theory, accurately identify children at risk of morbidity and mortality. However, whether the inclusion of weight information is critical to this process is far from clear, and the observations made during this study could not answer this question. Examination of the literature reveals that some programmes include growth monitoring as part of the screening process, while other programmes do not find it necessary. What this study did show was that in spite of having weight information available, health workers did not accurately select a considerable number of at-risk children for interventions. It also showed that such a high percentage of children at the sessions were at-risk that the theoretical gain in health service efficiency by targeting was largely nullified by the considerable time required to weigh individual children. The effectiveness of screening was also reduced by the fact that the most at-risk children in Boga, as in many other health programmes, attended the sessions the least often. The non-representative coverage meant that the reliability of growth monitoring information for use in nutritional surveillance of the population would be heavily qualified if it were employed for that purpose, although none of the three programmes studied used the weight information for surveillance.

As a means of promoting health and nutrition education, it was not possible to say from this study or from a review of the literature whether the health education given by the staff was improved by having the child's weight information available, or whether the mothers were more receptive to the advice because they were more aware of the risks faced by their child. What can be said from this study is that the quality of health and nutrition education was fairly poor. Not all the children indicated received interventions, and of those that did, the advice was usually cursory. The main determinants of the quality of care were the training, supervision, skills and motivation of the health workers, and the availability of weight information would have had little impact. Where growth monitoring had an effect was on the time available for interventions: if all children are to be managed individually, as growth monitoring implies, then it would be difficult to greatly improve the quality of interventions in the programmes studied, given similar time and resources.

It is not certain that mothers in these programmes were motivated to attend sessions more often by the fact of learning their child's weight. The little information available in the literature on this question is inconclusive. It must also be added that the programmes did not fully exploit the potential interest of mothers in understanding the weight chart, the importance of weight gain, and the factors that promote child growth and illness, as a means of engaging them in actions to improve child health. Some programmes reported in the literature have found growth monitoring useful for promoting community participation, while others state flatly that monitoring has not engaged the interest of the community. As was found for the health and nutrition interventions in the three programmes studied, factors other than growth monitoring were of over-riding importance in determining the process of community involvement.

All of these observations, coupled with the vigorous promotion of growth monitoring in many countries, point to the major need in growth monitoring which is for cost-effectiveness research to establish its role in the delivery of health care and in the education and motivation of mothers and communities. Cost-effectiveness studies are useful for allocative choice, not for normative and distributive judgements, and would be appropriate in this area where the advisability of focussing health efforts on young children is not disputed, but the methods and strategies are (*Unger and Killingsworth* 1986).

Two questions need to be examined: first, to establish the separate contribution of growth monitoring to the effectiveness of child health programmes, as measured by coverage, growth, and where possible, morbidity and mortality, by comparing programmes which are identical except for the presence or absence of growth monitoring. Secondly, operational research is needed which studies exactly how growth monitoring produces its effects, whether on the knowledge and behaviour of mothers and other community members, on the actions of health workers and their supervisors, and/or on the quality of care given to children by health workers and mothers (using criteria defined by both health workers and mothers to assess quality). Finally, it should relate utilization rates to the perceived quality of care. By combining this information with a careful computation of the costs associated with growth monitoring at all levels, it would be possible to make an assessment of its cost-effectiveness. If possible, the costs should include costs to the mothers and any volunteer workers ie. both financial and economic costs of the activity should be included. This would provide a foundation for developing more cost-effective child health programmes as well as for projecting costs to evaluate their sustainability (*Unicef* 1987).

This research should first be carried out in a programme with adequate levels of managerial, financial and other resources in order to establish the theoretical soundness of the concept of growth monitoring, that is, whether it is an appropriate response to child health problems when used under maximally favourable programmatic conditions. This stage would be conducted in small-scale pilot studies which could maximize internal validity (*Rossi* 1979). Experiments to test the effects of varying intensity and different types of delivery should be designed eg. screening by arm circumference rather than by weighing, having mothers rather than health workers screen children, testing monitoring in programmes where emphases differed between using growth monitoring for health interventions and using it for community education and motivation.

If indicated by these pilot studies, the next step would be to establish whether growth monitoring could be used effectively to reach the target population at levels of financial, managerial and logistic inputs which are realistic in most developing country health systems (*Rossi* 1979). This could be done by introducing growth monitoring into existing child health programmes and using operational research methods to determine organizational and environmental barriers to effective implementation of the chosen strategy and to evaluate alternative strategies. Besides studying outcomes in terms of the effects on mothers and children, the effect of adding growth monitoring to the other activities of the health workers should also be studied.

It appears that growth monitoring could be a useful bulwark against the tide to promote vertically-organized and selective health services (*Walsh and Warren* 1979), since it provides a single focal point where all the resources of the health service can be brought to bear on children's main health problems. As Gopalan (1980) said for nutrition programmes, growth monitoring must not become the focus of interest, but must be an integral part of primary health care which must be a component of a programme of socio-economic development of the community. If growth monitoring is used as a screening strategy in child health programmes, health and nutrition care can reinforce each other in temporarily overcoming episodes of risk. But if growth monitoring is used as an educational and motivational strategy, then the possibility of the third element, community awareness, participation and development, could make the effects on child health long-term and permanent.

However, the theories about the usefulness of growth monitoring are still unproven, and not supported by carefully designed research. From the evidence of many existing programmes, it appears that growth promotion does not necessarily need to include growth monitoring, and the existence of growth monitoring does not necessarily imply that growth is being promoted. Before better scientific information about growth monitoring becomes available, major initiatives to introduce growth monitoring into child health programmes should not be supported by governments or by financing agencies. Instead, much can be done to improve the care offered in child health programmes by attention to more critical elements, such as training and supervision of health workers, provision of supplies and facilities for preventing and treating illness, and implementation of methods to improve coverage of care. The more complex causes of malnutrition such as poverty, poorly functioning families, and lack of time of women for child care, cannot be addressed unless the parents and communities are educated about their rights and responsibilities in health care. Approaches which foster the participation of communities in their own development are the most solid foundation for the permanent achievement of the health goals of the population. It remains to be proven whether growth monitoring is an important part of this process, although the results of this study indicate that it probably is not.

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APPENDIX A

SUPPLEMENTARY STATISTICAL TABLES

Table A1
CLASSIFICATION AND CUT-OFF POINTS FOR DEFINING MALNUTRITION

System	*Reference Population*	*Method*	*Classification*
a. **Weight-for-Age**			
Gomez et al 1956	Harvard	% of median	>90%: normal 90-75%: mild malnutrition 75-61%: moderate <=60%: severe
Jelliffe 1966	Harvard	% of median	90-81%:mild 80-71%:mild/moderate 70-61%:moderate <=60%:severe
WHO 1978	NCHS	percentile	50th-3rd: normal <=3rd: malnourished
b. **Height-for-Age**			
WHO 1976	Harvard	% of median	105-93%: normal 93-80%: short <80%: dwarf
Waterlow 1977	Harvard	% of median	95-90%: mild 89.9-85%: moderate <85%: severe
CDC 1979	NCHS	% of median	>=90%: adequate <90%: stunted or chronically malnourished
c. **Weight-for-Height**			
NCHS 1976	NCHS	percentile	75th-25th: normal 10th-5th: moderate <5th: severe
Waterlow 1977	Harvard	% of median	110-90%: normal 89.9-80%: mild 79.9-70%: moderate <70%: severe
d. **Arm circumference**			
Shakir 1975	Wolanski 16.5 cm.	% of median	>85% or >14 cms:normal 85-76% or 14-12.5 cms: malnourished <76% or <12.5 cms: severely malnourished

Sources:
Gomez et al 1956, *Waterlow et al* 1977, *American Public Health Association* 1981

Table A2
NUMBER OF CONSULTATIONS OBSERVED FOR DIFFERENT TYPES OF HEALTH WORKERS, IN BOGA, KASONGO AND KATANA

Boga Type of Worker	No.	*Kasongo* Type of worker	No.	*Katana* Type of worker	No.
clinic helper	20	staff nurse 1	31	staff nurse 1	23
supervisor 1	7	staff nurse 2	18	staff nurse 2	28
supervisor 2	16	staff nurse 3	31	staff nurse 3	32
student nurse 1	26	staff nurse 4	16	staff nurse 4	12
student nurse 2	15	clinic aide	22	staff nurse 5	15
student nurse 3	19			2-year nurse	9
student nurse 4	22			student nurse	11
1st year student	9			auxiliary 1	12
				auxiliary 2	13
				auxiliary 3	14
				auxiliary 4	14
				auxiliary 5	10
				auxiliary 6	7
				auxiliary 7	9
				auxiliary 8	12
				auxiliary 9	25
				auxiliary 10	14
				auxiliary 11	8
Total	134		118		268

Table A3
GENERAL SOCIO-ECONOMIC CHARACTERISTICS OF SAMPLED POPULATION IN BOGA HEALTH ZONE

Tribe	*No.*	*%*
Wangiti	226	41%
Wahema	270	49%
Other	51	9%
Total	547	

Educational level	*Mother**		*Father*	
	No.	*%*	*No.*	*%*
Never studied	226	42	70	15
1-4 yrs. primary	170	31	117	25
5-6 yrs. primary	105	19	115	24
Secondary	43	8	129	28
Total	544		472	

* Education level was not recorded for three women

Occupation	*Mother**		*Father*	
	No.	*%*	*No.*	*%*
Farmer	515	95	343	63
Cattle-raiser	1	0.2	60	11
Trader	4	0.7	13	2
Nothing/school	14	3	46	9
Professional	4	0.7	43	8
Skilled/semi-skilled	3	0.6	17	3
Other	1	0.2	18	3
Total	542		486	

* Occupation was not recorded for five women

Civil status of mothers	*No.*	*%*
Father living with mother	452	83
No partner	95	17
Total	547	

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Table A3 (Cont'd)

Parity of mothers	*No.*	%
1 child	109	20
2-3	212	39
4-5	150	27
6+	76	14
Total	547	

Crops grown	*No.*	%
Starch only	98	18%
Starch + up to 3 other crops	257	48%
Starch + 4 or more other crops	184	34%
Total	539	

No. of cows owned	*No.*	%
0	398	73
1-29	106	19
30-59	17	3
60-99	16	3
100+	10	2
Total	547	

Type of housing	*No.*	%
Lowest: Kitchen inside, thatch roof	312	57
Medium: Kitchen outside, thatched roof	204	37
Highest: Zinc roof	31	6
Total	547	

Socio-economic level	*No.*	%
2-5 points	165	30
6-9	294	54
10-19	88	16
Total	547	

Table A4
HEALTH SERVICE COVERAGE IN BOGA HEALTH ZONE

Place of birth of last child	*No.**	*%*
Health facility	480	89
At home	61	11
Total	541	

* This information was not recorded for six mothers

Distance and time to child health sessions, as estimated by mothers

Distance	*No.*	*%*	*Time*	*No.*	*%*
<1 km	127	34	<30 min.	209	47
1-2 km	179	47	30-60 min.	122	28
>=3 km	69	18	>=60 km.	110	25
Total	375			441	

Attendance rate of index children

Per cent of times possible	*No.*	*%*
Never attended	105	19
<50%	119	22
50-65%	183	34
66%-100%	140	26
Total	547	

Number of weighings of index children

Times weighed	*No.*	*%*
Never weighed	105	19
1-6	93	17
7-12	120	22
13-24	172	31
25+	57	10
Total	547	

Immunization coverage of index children

	*Age category**	*No. of children in age-gp*	*No. and % immunized*		*% of total population (x .81)*
BCG by 3 mo.	1-3 mo.	45	39	87	70
3 DPT by 6 mo.	4-6 mo.	37	30	82	66
Measles by 12 mo.	10-12 mo.	31	27	87	70
All doses by 12 mo.	10-12 mo.	31	25	81	66
All doses by 18 mo.	10-18 mo.	103	91	88	71
All doses by 23 mo.	13-24 mo.	134	122	91	74
All doses by 59 mo.	10-59 mo.	372	350	94	76

* The date of each immunization was not recorded, so that children were selected for the analysis whose current ages were between the minimum age for the vaccine and the maximum age considered as the desirable target. "Minimum age" was calculated as one month after the child should have received the vaccine, to eliminate those few who had become eligible at the time of the interview but had been too young to receive the vaccine at the previous child health session.

Table A5
CONSULTATION TIME PER CHILD IN CHILD HEALTH SESSIONS OBSERVED, WELL CHILDREN AND AT-RISK CHILDREN

	No. of seconds	*Well Children*		*At-Risk children*		*All Children*	
		No.	*%*	*No.*	*%*	*No.*	*%*
1. <u>Boga</u>							
	0-59	9	69	12	52	21	58
	60-119	2	15	7	31	9	25
	120 +	2	15	4	17	6	17
	Total	13		23		36	
2. <u>Kasongo</u>							
	0-59	14	56	7	21	21	36
	60-119	8	32	15	46	23	40
	120 +	3	12	11	33	14	24
	Total	25		33		58	
3. <u>Katana</u>							
	0-59	5	11	12	14	17	13
	60-119	21	48	29	35	50	39
	120 +	18	41	43	51	61	48
	Total	44		84		128	
4. <u>All three programmes</u>							
	0-59	28	34	31	22	59	27
	60-119	31	38	51	36	82	37
	120 +	23	28	58	41	81	36
	Total	82		140		222	

Table A6
COSTS OF GROWTH MONITORING ACTIVITIES IN BOGA, 1986

Items	*Cost* Zaires per month	£ per year
<u>Staff</u>		
1 supervisor 13 days/month	731	117
1 supervisor 5 days/month	313	50
1 chauffeur 13 days/month	785	126
14 VHWs 6 days/month	700	112
10 nurses 1/2 day/month	270	43
Total	2798	448
<u>Travel</u>		
Land-Rover 400 km/month at Z33/km	13,200	2112
Motorcycle 73 km/month at Z16/km	1168	187
Total	14,368	2299
<u>Materials</u>		
Paper, pens	825	11
Growth charts Z10 each--1245/yr	12,450	166
Total	13,275	177
<u>Scales</u>		
18 at £20 each over five years		72
Total costs		2996
Less: Receipts from registration fees of Z30 each --1245 children/yr		498
Net costs		2498

Table A7
COSTS OF GROWTH MONITORING ACTIVITIES IN KASONGO, 1986

Items	*Costs per health centre per month* *Zaires*	*£*	*Costs for 19 health centres for 1 year (£)*
<u>Staff</u>			
Nurse 4 days/month	420		
Auxiliary 2 days/month	125		
Clerk 4 days/month	200		
Physician[1]	7		
Total	752	10.02	2286
<u>Travel</u>			
Nurse's bicycle 4 days/month	42	0.56	128
4-wheel vehicle at Z45/km[2]	145	1.93	441
Total	187	2.49	568
<u>Materials</u>			
Paper, pens		0.07	16
Growth charts Z10--8.9/month		1.2	271
Total		1.09	287
<u>Scales</u>			
19 at £20 each over 5 years		0.33	76
Total costs		14.1	3217
Less: Receipts from registration fees of Z30 each--8.9/month	267	3.56	812
Net costs		10.56	2405

[1] Each of 4 physicians might supervise 2 sessions per year, for a total of 8 sessions which were supervised. At a salary of Z208 per working day for a Zairian physician, the salary cost of supervision was Z1664 between 19 health centres per year, or Z7.3 per month per health centre.

[2] The transportation cost per day of supervision has been calculated by the project at Z4130 per day. For 8 days of supervision, the cost would be Z33,040 to be shared between 19 health centres per year.

Table A8
COSTS OF GROWTH MONITORING ACTIVITIES IN KATANA, 1986

Items	*Zaires per month*	*£ per year*
Staff		
19 nurses 6 days/month	14,250	2280
38 auxiliaries 2 days/month	3800	608
38 daily-wage auxiliaries 8 days/mo	9120	1459
Nurse-supervisor 2.4 days/month	300	48
5 Physicians[1]	217	34
Total		4430
Travel [2]		
4-wheel vehicle 800km/year at Z20/km	16,000	213
Motorcycle 500 km/year at Z15/km	7,500	100
Total	23,500	313
Material		
Paper, pens	94	15
Charts, health booklets Z10 (total costs paid for by mothers)		
Scales		
19 at £20 each over 5 years		76
Total costs		4834
Less: Receipts from fees of Z10 per mother per year (20,000 mothers)		2667
Net costs		2167

[1] The five doctors might make a total of 250 supervisory visits per year, 5% of which were for child health sessions. The 12.5 visits cost Z208 per day, based on a Zairian physician's salary.

[2] Costs for the vehicles have been calculated by the project.

Table A9
INTERRELATIONSHIPS BETWEEN MOTHERS' DESCRIPTIVE VARIABLES

1. **<u>Associations between attendance rate and mothers' characteristics</u>**

	Attendance Rate (% of mothers)				
	0	<50%	50-74%	75+%	Total
Educational level					
no schooling	24	26	34	16	100
1-4 years	18	19	35	28	100
5+ years	14	18	30	38	100
	X^2=25.5 6 d.f. p<0.001				
Tribe					
Wangiti	19	23	36	23	101
Wahema	17	21	33	30	101
Other	36	24	24	18	100
	X^2=13.3 6 d.f. p<0.04				
Parity					
1 child	22	18	30	29	99
2 children	18	18	36	28	100
3+ children	21	23	33	23	100
	X^2=4.2 4 d.f. p>0.05				
Socio-economic level					
1-5 points	19	24	38	19	100
6-9 points	22	20	34	24	100
10-19 points	18	22	22	39	101
	X^2=15 6 d.f. p<0.02				

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Table A9 (Cont'd)

2. Associations of mothers' educational level with tribe, parity and socio-economic level

Educational level (% of mothers)

	no schooling	1-4 years	5+ years	Total
Tribe				
Wangiti	45	39	17	101
Wahema	36	26	37	99
Other	55	24	22	101

X^2=31.4 4 d.f. $p<0.001$

	no schooling	1-4 years	5+ years	Total
Parity				
1 child	33	43	24	100
2 children	41	29	31	101
3+ children	45	28	27	101

X^2=9.6 4 d.f. $p<0.05$

	no schooling	1-4 years	5+ years	Total
Socio-economic level				
1-5 points	49	35	16	100
6-9 points	39	30	31	100
10-19 points	35	30	35	100

X^2=16 4 d.f. $p<0.003$

3. Associations of mothers' tribe with parity and socio-economic level

Tribe (% of mothers)

	Wangiti	Wahema	Other
Parity			
1 child	21	17	28
2 children	20	18	24
3+ children	59	65	49
Total	100	100	101

X^2=5.4 4 d.f. $p<0.1$

	Wangiti	Wahema	Other
Socio-economic level			
1-5 points	33	26	39
6-9 points	57	51	57
10-19 points	11	23	4
Total	101	100	100

X^2=20.9 4 d.f. $p<0.001$

...continued on next page

Table A9 (Cont'd)

4. Associations between parity and socio-economic level

Socio-economic level	Parity (% of mothers) 1 child	2 children	3+ children
1-5 points	42	31	25
6-9 points	44	51	59
10-19 points	14	18	16
Total	100	100	100

$X^2=12$ 4 d.f. $p<0.02$

Table A10
MOTHERS' INTERPRETATION OF OWN CHILD'S AND SAMPLE GROWTH CHARTS

Answer	*Own child's* *No.*	*%*	*Chart A* *No.*	*%*	*Chart B* *No.*	*%*	*Chart C* *No.*	*%*
Correct	224	51	276	50	248	45	279	51
Incorrect	218	49	271	50	299	55	268	49
Total	442		547		547		547	

Table A11
RESPONSE OF MOTHERS TO CHILD'S LOSS OF WEIGHT*

Response	*No.*	*%*
Give milk	385	85
Give cassava leaves	275	61
Give peanuts/beans/soya	214	47
Give meat/fish/eggs	200	44
Give worm medicine	47	10
Give other medicine (unspecified)	53	12
Take to clinic/nurse	40	10
Don't know	6	1
Number of respondents	451	

* Up to four answers were recorded for each mother. Ninety mothers were not asked this question, for reasons explained in Section 7.4.1.

Table A12
RESPONSE OF MOTHERS TO CHILD'S ANOREXIA*

Response	*No.*	*%*
Wait/do nothing	13	2
Push/encourage to eat	244	45
Go to dispensary/nurse	135	25
Give enema	88	16
Give prefereed foods	85	16
Give liquids/breast only	57	10
Other (us. worm medicine)	44	8
Give "special" food	21	4
No anwer	95	17
Number of respondents	452	

Mothers giving correct answers:

No. of correct responses	*No.*	*%*
0	121	22
1	364	67
2	60	11
3	2	0.4
Total	547	

* Up to three answers were recorded for each mother

Table A13
NUMBER OF MOTHERS GIVING SOLID FOOD BEFORE NINE MONTHS OF AGE

Food given	*No.*	*%*
Porridge	536	98
Fruit	514	94
Eggs	492	90
Green vegetables	485	89
Beans	431	78
Meat or fish	351	64
All foods	299	55
Total	547	

Table A14
TYPE OF FOOD EATEN BY INDEX CHILD ON DAY PREVIOUS TO INTERVIEW (12-35 MONTH-OLDS ONLY)

Score	*No.*	*%*
1-5	69	21
6-8	148	44
9-16	117	35
Total	334	

Table A15

MOTHERS' KNOWLEDGE OF CAUSES OF DIARRHOEA*

Causes	*No.*	%
Worms	267	49
Child's dirty hands	121	22
Dirty water	102	19
Mother's dirty hands	75	14
Dirty dishes	48	9
Uncovered food	41	7
Dirty W.C.	20	4
Other (teething, fever)	84	15
No answer	131	24
Number of respondents	416	

Mothers giving correct answers:

No. of correct answers	*No.*	%
0	140	26
1	186	34
2	105	19
3	116	21
Total	547	

* Up to three answers were recorded for each mother

Table A16
MOTHERS' RESPONSES TO CHILD'S LAST EPISODE OF DIARRHOEA*

Response	*No.*	*%*
Used sugar in water	251	47
Used salt in water	250	47
Boiled water	236	44
Went to dispensary/nurse	191	36
Gave enema	26	5
Gave lots of water	16	3
Gave ORS packet	16	3
Other (us. traditional med.)	60	11
No answer	90	
Number of respondents	457	

Mothers giving correct responses:

No. of correct responses	*No.*	*%*
0	134	24
1	144	26
2	29	5
3	202	37
4	38	7
Total	547	

* Up to four answers were recorded for each mother

Table A17
MOTHERS' METHODS OF MIXING ORS

Method	*No.*	*%*
Correct solution	70	26
Mixed by glassful	105	40
Sugar correct/salt in excess	2	0.8
Too little sugar/salt correct	53	20
Both sugar and salt incorrect	8	3
Other	27	10
No answer	282	52
Total respondents	265	

Table A18

ASSOCIATIONS BETWEEN MOTHERS' CHARACTERISTICS AND COMPOSITE SCORES FOR KNOWLEDGE OF GROWTH CHARTS AND KNOWLEDGE AND PRACTICES RE FEEDING OF CHILDREN AND DIARRHOEA

Mothers with more than 50% of answers correct

	Growth Charts					*Feeding of Children*					*Diarrhoea*				
	No.	%	X^2	df	p	No.	%	X^2	df	p	No.	%	X^2	df	p
<u>Educational level</u>															
no schooling	64/226	28				112/224	50				32/226	14			
1-4 years	117/170	69				94/170	55				46/170	27			
5+ years	136/148	92				84/148	57				68/148	46			
Total	317/544	58	160.0	2	<0.001	290/542	54	1.9	2	n.s.	146/544	27	46.0	2	<0.001
<u>Parity</u>															
1 child	62/100	62				59/108	55				24/109	22			
>1 child	256/447	57				232/437	53				123/438	28			
Total	318/547	58	0.0	1	n.s.	291/545	53	0.03	1	n.s.	147/547	27	1.3	1	n.s.
<u>Tribe</u>															
Wangiti	117/226	52				118/224	53				50/226	22			
Wahema	179/270	66				154/270	57				89/270	33			
Other	22/51	43				19/51	37				8/51	16			
Total	318/547	58	15.9	2	<0.001	291/545	53	6.0	2	<0.05	147/547	27	10.9	2	<0.005
<u>Socio-Economic level</u>															
1-5 points	83/156	53				96/165	58				22/165	13			
6-9	180/303	59				146/292	50				94/294	32			
10-19	55/88	62				49/88	56				31/88	35			
Total	318/547	58	4.0	2	<0.1	291/545	53	3.1	2	n.s.	147/547	27	22.4	2	<0.001
<u>Attendance rate</u>															
0	34/105	32				51/105	49				11/105	10			
<50%	70/119	59				60/119	50				25/119	21			
50-74%	110/183	60				96/181	53				59/183	32			
75+%	104/140	74				84/140	60				52/140	37			
Total	318/547	58	52.3	3	<0.001	291/547	53	3.9	3	n.s.	147/547	27	26.6	3	<0.001
<u>Number of weighings</u>															
0	34/105	32				51/105	49				11/105	10			
1-12	129/213	61				118/211	56				53/213	25			
13-24	119/172	69				85/172	49				53/172	31			
25+	36/57	63				37/57	65				30/57	53			
Total	318/547	58	46.0	3	<0.001	291/547	53	5.7	3	n.s.	147/547	27	35.4	3	<0.001

Table A19
ASSOCIATIONS BETWEEN MOTHERS' CHARACTERISTICS AND COMPOSITE SCORES FOR KNOWLEDGE, PRACTICES AND TOTAL SCORE FOR KNOWLEDGE AND PRACTICES

	Mothers with more than 50% of answers correct														
	Knowledge					*Practices*					*Knowledge and Practices*				
	No.	%	X^2	df	p	No.	%	X^2	df	p	No.	%	X^2	df	p
<u>Educational level</u>															
no schooling	46/226	20				115/226	51				86/226	38			
1-4 years	78/170	46				114/170	67				111/170	65			
5+ years	105/148	71				108/148	73				118/148	80			
Total	229/544	42	95.4	2	<0.001	337/544	62	21.2	2	<0.001	315/544	58	69.3	2	<0.001
<u>Parity</u>															
1 child	36/109	33				62/109	57				57/109	52			
>1 child	194/438	44				276/438	63				259/438	59			
Total	230/547	80	4.1	1	<0.05	338/547	62	1.1	1	n.s.	316/547	58	1.4	1	n.s.
<u>Tribe</u>															
Wangiti	76/226	34				142/226	63				115/226	51			
Wahema	139/270	52				171/270	63				181/270	67			
Other	15/51	29				25/51	49				20/51	39			
Total	230/547	80	19.8	2	<0.001	338/547	62	3.9	2	n.s.	316/547	58	21.1	2	<0.001
<u>Socio-Economic level</u>															
1-5 points	53/165	32				100/165	61				83/165	50			
6-9	134/294	46				187/294	64				178/294	61			
10-19	43/88	49				51/88	58				55/88	63			
Total	230/547	80	9.9	2	<0.01	338/547	62	1.1	2	n.s.	316/547	58	5.5	2	<0.1
<u>Attendance rate</u>															
0	31/105	30				44/105	42				37/105	35			
<50%	40/119	34				70/119	59				62/119	52			
50-74%	81/183	44				118/183	65				110/183	60			
75+%	78/140	56				106/140	76				107/140	76			
Total	230/547	80	21.3	3	<0.001	338/547	62	30.1	3	<0.001	316/547	58	43.8	3	<0.001
<u>Number of weighings</u>															
0	31/105	30				44/105	42				37/105	35			
1-12	81/213	38				140/213	66				125/213	59			
13-24	86/172	50				109/172	63				111/172	65			
25+	32/57	56				45/57	79				43/57	75			
Total	230/547	80	17.3	3	<0.001	338/547	62	26.3	3	<0.001	316/547	58	32.4	3	<0.001

Table A20
NUMBER AND PER CENT OF MOTHERS ANSWERING MORE THAN 50% OF QUESTIONS CORRECTLY

Question	*No.*	%
Understanding of growth charts	229	42
Feeding knowledge and practices	284	52
Diarrhoea knowledge and practices	400	73
Knowledge	317	58
Practices	241	44
Knowledge and practices combined	257	47

Table A21
ASSOCIATIONS BETWEEN DEFICIT IN HEIGHT-FOR-AGE AND WEIGHT-FOR-HEIGHT AND MOTHERS' SCORES FOR KNOWLEDGE AND PRACTICES (COMBINED QUESTIONS)

Percent Correct Responses of Mother	*Height-for-age*					*Weight-for-height*				
	No.	%	X^2	df	p	No.	%	X^2	df	p
<u>Knowledge score</u>										
<=50%	147/332	44				65/362	18			
>50%	79/274	28				65/295	22			
Total	226/606	37	14.7	1	<0.001	130/657	20	1.5	1	n.s.
<u>Practice score</u>										
<=50%	82/223	37				48/244	20			
>50%	142/381	37				82/411	20			
Total	224/604	37	0.001	1	n.s.	130/655	20	0.0	1	n.s.
<u>Total score for K+P</u>										
<=50%	99/229	43				47/254	19			
>50%	127/377	34				83/403	21			
Total	226/606	37	5.1	1	<0.025	130/657	20	0.3	1	n.s.
<u>Score re feeding</u>										
<=50%	107/290	37				65/316	21			
<50%	117/314	37				65/339	19			
Total	224/604	37	0.00	1	n.s.	130/655	20	0.1	1	n.s.
<u>Score re diarrhoea</u>										
<=50%	175/433	40				90/472	19			
>50%	51/173	30				40/185	22			
Total	226/606	37	5.9	1	<0.025	130/657	20	0.3	1	n.s.
<u>Score re growth charts</u>										
<=50%	101/234	43				47/254	19			
>50%	125/372	34				83/403	21			
Total	226/606	37	5.2	1	<0.025	130/657	20	0.3	1	n.s.

APPENDIX B

OBSERVATION SHEET FOR CHILD HEALTH SESSIONS

(The health workers were observed while weighing children and consulting with mothers. A tick mark was put beside each activity carried out for each mother and child seen in turn.)

	MOTHER/CHILD			
<u>WEIGHING</u>	1	2	3	4

1. needle at zero before reading
2. child not wearing shoes or jumper
3. needle steady before reading
4. child calm
5. weight read exactly (+-100 gm.)
6. mother looks at scale or asks weight
7. weigher tells the weight

<u>CONSULTATION</u>

Nurse:

1. mentions about attendance
2. says something about weight status or change
3. asks if child has had fever since last session
4. asks if child has had diarrhoea
5. asks if child has had other illness
6. examines eyes for anaemia
7. palpates spleen
8. examines feet for oedema
9. asks if child was treated, if ill
10. asks if child is eating well
11. asks if child has started eating solid food
12. asks if mother is pregnant

13. gives advice about treating illness
14. advises to feed child "well" (no details)
15. lists examples of foods to give
16. advises on frequency of feeding
17. advises quantity of food to give
18. advises about anorexia
19. advises to start child on solid food
20. advises on breast-feeding
21. recommends mother to family planning or pre-natal clinic
22. thanks/congratulates mother
23. grants mother a "holiday" from weighing
24. refers to nutrition rehabilitation programme
25. refers to health centre or hospital
26. asks questions re subject of the health talk

27. age of child (months)
28. weight rising parallel to reference curve
29. weight declining
30. weight stationary
31. number of months of consistent weight change
32. current month written on chart
33. age recorded accurately
34. weight recorded accurately
35. time taken for consultation

APPENDIX C

ENGLISH QUESTIONNAIRE

INTERVIEW WITH MOTHERS OF CHILDREN UNDER 5 YEARS OLD

NAME OF VILLAGE	DATE
NAME OF MOTHER	NAMES OF RESEARCHERS
FAMILY NAME	INTERVIEWER:
CENSUS NUMBER	WRITER:

Introduction of researchers and purpose of interview. Ask permission to talk to mother and measure children under 5.

PART 1. MEMBERS OF THE FAMILY

Write the names of all people living in the household.

Number	Name	Sex	Date of birth	Relationship to head of household	Occupation
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

READ the names of everyone in the list and ask if that is everyone who lives there. Is there anyone else new or anyone who has left recently? "Household" means anyone who is living in the house for at least one month. Add other names on the back of the questionnaire if there is insufficient space.

1.2 To what tribe does this household belong (or the mother, if there is no male head)
1. Wangiti 2. Wahema 3. Other (write)

1.3 Are you married, never married, widowed, divorced?
1. married Q1.4 2. never married Q1.8 3. widowed Q1.8
4. divorced Q1.8 5. no answer Q1.8

1.4 Does your husband live here, or elsewhere in order to work or for some other reason?
1. lives here Q1.6 2. not here Q1.5

1.5 How many months has it been since your husband was here?
1. less than a month 2. 1-2 months 3. 3-6 months 4. over 6 months

1.6 How many years of schooling does your husband have?
1. none 2. 1-4 primary 3. 5-6 primary 4. 1-2 secondary
5. 3-6 secondary 6. beyond secondary 8. don't know
9. no answer

1.7 Did you study, and up to what level?
1. didn't study 2. 1-4 primary 3. 5-6 primary 4. 1-2 secondary
5. 3-6 secondary 6. beyond secondary

1.8 In what maternity clinic was your last child born?
1. doesn't remember 2. name of clinic________
3. born at home

PART 2. HEALTH SERVICE

2.1 Have you ever attended the weighing clinic for children?
1. yes Q2.2 2. no Part 3

2.2 How far is the weighing clinic from here?
(in kilometers and/or in minutes of walking)

PART 3. GROWTH MONITORING CHARTS FOR CHILDREN

3.1 How do you know that your child is growing well? (ASK anything else? after an answer is given)
1. eats well 2. chart shows growth 3. good humor 4. plays well
5. physical development 6. mental development 7. good health
8. weight increases 9. clothes are smaller 0. other (specify)

IF THERE IS ONE CHILD, USE ITS NAME IN THE NEXT QUESTIONS
IF THERE IS MORE THAN ONE CHILD, USE THE ONE CLOSEST TO 2 YEARS OF AGE AS "NAME"

3.2 Do you have a growth chart for "name"? (SHOW the mother a sample chart)
1. yes Q3.3 2. no Q3.13 3. lost, or can't find it Q3.15

ASK May I see the chart?

3.3 What is this chart used for? What is its importance?
1. to write vaccines given 2. to write child's weight
3. to know the health of child 8. don't know 4. other (specify)

IF THE MOTHER HAS A HUSBAND:

3.4 Does your husband look at the child's growth chart when you return from a weighing clinic?
1. yes 2. no 3. asks about child's weight

3.5 Can you show me on "name's" chart where its weight was the last time it was weighed? (mother should point to the weight on the chart)
1. correct answer Q3.6 2. incorrect answer Q3.6 8. doesn't know Q3.7 9. no answer Q3.7

3.6 Does the chart show that "name" was growing well or not growing well, the last time it was weighed.
1. correct answer 2. incorrect answer 8. don't know
9. no answer

3.7 Who taught you about the growth chart?
1. nurse 2. another woman 3. no-one 8. don't know 9. no answer
4. other

3.8 What did the person who weighed "name" tell you about his/her weight?
1. didn't say anything Q3.16 2. said thank you Q3.16 3. did some teaching Q3.9 8. don't know Q3.16 9. no answer Q3.16

3.9 What did the nurse tell you to do?

3.10 Was it possible for you to do what the nurse said?
1. yes Q3.11 2. no Q3.12 9. no answer Q3.16

3.11 What happened?

GO TO QUESTION 3.16

3.12 Why?

GO TO QUESTION 3.16
SHOW THE SAMPLE CHARTS TO THE MOTHER

3.13 Have you ever seen or heard of these charts?
1. yes Q3.14 2. no Part 4

3.14 Have you ever had a chart like this for "name"
1. yes 2. no 8. don't know 9. no answer

3.15 Can you tell me what this chart is for? What is its importance?
1. write vaccines given 2. write child's weight 3. to know the health of child 8. don't know 4. other (specify)

SAY Now I will show you some charts of other children and ask you some questions about them. SHOW the charts to the mother: A B and C

3.16 Chart A:does it show that the child is growing well or not growing well?
1. growing well 2. not well 8. don't know 9. no answer

3.17 Chart B:does it show that the child is growing well or not growing well?
1. growing well 2. not well 8. don't know 9. no answer

3.18 Chart C:does it show that the child is growing well or not growing well?
1. growing well 2. not well 8. don't know 9. no answer

IF THE MOTHER SAYS THAT ONE OF THE CHARTS SHOWS A CHILD IS NOT GROWING WELL, SHOW HER THAT CHART AGAIN AND ASK QUESTION 3.19

3.19 What would you do this a child who is not growing well, if s/he were yours?
1. give worm medicine 2. give another type of medicine 3. cassava leaves 4. eggs 5. beans 6. meat/fish 7. go to health centre 8. don't know 9. no answer 0. other (specify)

PART 4. FOOD

4.1 How many times a day does a child of 1 or 2 years of age need to eat?
1. 2 times 2. 3 times 3. 4 times 4. more than 4

4.2 At about what age did your child start to eat...(tick in columns)

Food	0-4 mo	5-8 mo	9-12 mo	>12	no answer
a. porridge					
b. fruit					
c. vegetables					
d. peanuts					
e. meat/fish					
f. eggs					
g. cow's milk					

4.3 How many times did "name" eat yesterday?
1. once 2. twice 3. 3 times 4. 4 or more times 8. don't know

4.4 Yesterday were you at home for most of the day or did you go out somewhere for a long time?
1. at home 2. went out

4.5 What did "name" eat yesterday--
first meal ______
second meal ______
third meal ______
fourth meal ______

PART 5. DIARRHOEA

5.1 The last time your child had diarrhoea, what did you do for it? (ASK anything else? after an answer is given)
1. never had diarrhoea Q5.3 2. went to nurse Q5.3 3. gave a lot of water Q5.3 4. boiled water Q5.3 5. used salt Q5.2 6. used sugar Q5.2 7. used ORS sachet Q5.2 8. other (specify) Q5.3

5.2 How did you prepare the medicine?

5.3 What are the things that cause diarrhoea? (ASK anything else? after an answer is given)
1. dirty hands of the mother 2. dirty hands of the child 3. dirty water 4. dirty dishes 5. dirty W.C. 6. uncovered food 7. worms 8. don't know 0. other (specify)

5.4 If your child is sick and doesn't want to eat, do you just wait for its appetite to return, or do you do something about feeding it? (ASK anything else? after an answer is given)
1. nothing, just wait 2. push/encourage it to eat 3. give it preferred food 4. give liquids only 5. give special food (write) 6. go to dispensary/nurse 7. enema 0. other (specify)

PART 6. ORGANIZATION OF THE HOUSEHOLD

6.1 In the past week, were there days in which you were out the majority of the day, that is you went out in the morning and came back in the afternoon, to go to the market or the fields or somewhere?
1. yes Q6.2 2. no Q6.3 8. don't know Q6.3

6.2 How many times did you go out for the most of the day during the past week?
1. 1-2 times 2. 3-4 3. 5-6 4. >6 9. no answer

6.3 Was this a typical week, or was it unusual in the way you went out or stayed in?
1. typical 2. unusual

6.4 When you go out for a long time, do you take "name" with you, or do you leave him/her at home?
1. take with Part 7 2. leave at home Q6.5 3. both Q6.5

6.5 Does someone stay with "name" when you go out for an extended period? Who?
1. no-one Part 7 2. grandmother Part 7 3. aunt Part 7
4. husband Part 7 5. other woman Part 7 6. older child Q6.6
9. no answer Part 7 8. other (specify) Part 7

6.6 How many years old is the older child?

PART 7. SOCIO-ECONOMIC INFORMATION

7.1 What do you cultivate? (tick)
cassava sweet potatoes plantains rice peanuts beans vegetables
soya other

7.2 Do you eat most of these crops, or do you sell most of them?
1. eat 2. sell

7.3 What animals do you have?
1. goats Q7.4 2. cows Q7.5 3. pigs Q7.6 4. chickens Q7.6

7.4 How many goats do you have?

7.5 How many cows do you have?
1. with another herd 2. own herd 3. both

7.6 What do you use to see at night?
1. reed torch 2. wick in bottle of kerosene 3. kerosene lamp
4. torch (with batteries)

OBSERVE THE HOUSE AND CIRCLE THE RELEVANT ANSWER FOR EACH OF THE FOLLOWING

Roof 1. grass 2. zinc
Walls 1. grass 2. mud/wattle 3. cement, wood
Floor 1. mud 2. partial cement 3. cement
Door 1. grass 2. curtain 3. wood
Kitchen 1. separate 2. in the house

PART 8. MEASUREMENT OF CHILDREN UNDER 5

No.	Name	Date of birth	Arm (mm)	Kg. (cm)	Height

TELL THE RESULTS OF THE MEASUREMENT TO THE MOTHER, AND TELL HER TO GO TO THE WEIGHING CLINIC AS USUAL
ASK THE MOTHER IF SHE HAS ANY QUESTIONS
SAY THANK YOU

PART 9 INFORMATION FROM GROWTH CHART
Name of the child
Child's Number Date of birth

Age	Kg	Age	Kg	Age	Kg	Age	Kg	Age	Kg
0		12		24		36		48	
1	______	13	______	25	______	37	______	49	______
2	______	14	______	26	______	38	______	50	______
3	______	15	______	27	______	39	______	51	______
4	______	16	______	28	______	40	______	52	______
5	______	17	______	29	______	41	______	53	______
6	______	18	______	30	______	42	______	54	______
7	______	19	______	31	______	43	______	55	______
8	______	20	______	32	______	44	______	56	______
9	______	21	______	33	______	45	______	57	______
10	______	22	______	34	______	46	______	58	______
11	______	23	______	35	______	47	______	59	______

Yellow/Orange Card	Tick if completed	Pink Card
Zaire chart	Cross if not completed	Road to Health chart
Child's number		Name of health centre
Name of health centre		Child's number
Child's name		Child's name
Sex		Sex
Date of birth		Mother's name
Parents' names		Father's name
Address		Date of birth
Number of deliveries by mother		Siblings
Number of children still living		

Vaccines
BCG
DPT (number of doses)
Polio (number of doses)
Measles
Birthday months filled in?
Month completed for each weighing?
Errors? 1. no 2. yes
Reasons for special care (write)

SWAHILI QUESTIONNAIRE

MABISANO PAMOJA NA WAMAMA WA WATOTO CHINI YA MYAKA TANO

JINA LA KIJIJI	DATE
JINA LA MAMA	JINA LA MUULIZAJI
JINA LA MWENYE NYUMBA	MAULIZO
NUMERO YA RECENSEMENT	JINA LA KARANI

KIPANDE 1. WATU WA JAMAA

1.1 Andika watu wote wa nyumbani.

Numero	Nom	Sexe	Date de naissance	Lien avec chef de menage	Occupation
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

SOMA jina uliisha andika na uliza kama hesabu ni ya kweli. Kuna mutu mwingine mpya kwa nyumba ao kuna mtu asiye hapa? Menage ni kusema watu wanaishi pamoja nyumbani na wanabaki pamoja (karibu mwezi moja)

1.2 Kabila ya mwenye nyumba (ao mama kama anaishi bila bwana)
1. Wangiti2. Wahema3. Waingine (taja)

1.3 Unaoana, huyaoana, uko mujani wa bwana, unaacha bwana?
1. naoana M1.4 2. sioana M1.8 3. niko mujani M1.8
4. niliacha bwana M1.8 5. hakuna jibu M1.8

1.4 Bwana yako anabaki hapa, ao fwasi ingini kwa mambo ya kazi ao maneno maingine?
1. anaishi hapa M1.6 2. haishi hapa M1.5

1.5 Kutoka alikuwa hapa sasa inapita mwezi ngapi?
1. chini ya mwezi moja 2. mwezi 1-2 3. mwezi 3-6
4. kupita mwezi sita

1.6 Bwana wako alijifunja mpaka kalasi ya ngapi?
1. hakusoma 2. 1-4 kalasi ya chini 3. 5-6 kalasi ya chini
4. 1-2 kalasi ya juu 5. 3-6 kalasi ya juu 6. kupita kalasi ya juu 8. hajui 9. hakuna jibu

1.7 Ulisoma, na uliacha wapi? Kalasi ya ngapi?
1. hakusoma 2. 1-4 kalasi ya chini 3. 5-6 kalasi ya chini
4. 1-2 ya juu 5. 3-6 ya juu 6. kupita kalasi ya juu

1.8 Kwa maternite gani mtoto wako wa mwisho alizaliwa?
1. hakumbuke 2. andika jina la maternite 3. nyumbani

KIPANDE 2. KAZI YA AFYA

2.1 Uliisha enda hati siku moja kwa kipimo ya watoto?
1. ndiyo M2.2 2. hapana Kipande 3

2.2 Urefu gani unapatikana kipimo cha hapa?
kwa kilometre, kwa saa ya kutembea

KIPANDE 3. KARTASI YA KIPIMO YA MAENDELEO YA WATOTO

3.1 Namna gani munafahamu kama mtoto wenu anakomea mzuri? (ULIZA vitu vingine? kama viko nyuma ya majibu)
1. anakula vizuri 2. kartasi ya kipimo inaonesha maendeleo
3. mufurahivu 4. anacheza vizuri 5. ugeuko wa mwili
6. maendeleo ya akili 7. afya vizuri 8. kilo inaongezeka
9. nguvu kidogo sasa 0. ingine (taja)

KAMA KUNA MTOTO MOJA UTUMIKISHE JINA LAKE
KAMA KUNA WATOTO WAINGINE ULE ANAYEKOMELA KARIBU MIAKA 2

3.2 Una kartasi ya kipimo kama hi ya "Jina"? (ONYESHA kwa mama makartasi mbili)
1. ndiyo M3.3 2. hapana M3.13 3. inapotea, ao haipatikane M3.15

ULIZA nina pasha kuiona?
3.3 Kazi gani kartasi hii inafanya? Faida yake ni nini? (ULIZA vitu vingine kama viko nyuma ya majibu)
1. kuandika chindani 2. kuandika uzito ya mtoto
3. kujua afya 8. hajui 4. ingine (taja)

KAMA MAMA ANA BWANA;
3.4 Bwana wako anachungulia kweli juu ya kartasi ya kipimo ya mtoto, unapotoka kwa kipimo?
1. ndiyo 2. hapana 3. anauliza uzito wa mtoto

3.5 Unaweza kunionesha juu ya kartasi uzito ya "Jina" mara ya mwisho alipopimwa? (Mama anatiya vidole juu ya kartasi)
1. jibu ya kweli M3.6 2. jibu si ya kweli M3.6
3. hajui M3.7 4. hakuna jibu M3.7

3.6 Kartasi inaonesha ya kama "Jina" anakomea mzuri ao hapana kwa mwezi uliopita?
1. jibu ya kweli 2. jibu si ya kweli 8. hajui
9. hakuna jibu

3.7 Nani gani ulikufundishwa kufahamu fiche ya uzito?
1. munganga 2. bibi mwingine 3. hakuna mtu 8. hajui
9. hakuna jibu 4. ingine

3.8 Mtu ya kupima alikuambia nini juu ya uzito ya "Jina"?
1. hakusema M3.16 2. alileta asante M3.16 3. alileta mafundisha M3.9 8. hajui M3.16 9. hakuna jibu M3.16

3.9 Kitu gani munganga alikuambia ufanya?

3.10 Itawezekana kwako kufanya yale munganga alikuambia ufanye?
1. ndiyo M3.11 2. hapana M3.12 9. hakuna jibu M3.16
3.11 Kitu gani ilikushinda?

KWENDA kwa maulizo 3.16

3.12 Kwa nini? (taja)

KWENDA kwa maulizo 3.16

ONYESHA KARTASI KWA MAMA

3.13 Hujaona ao hujasikia juu ya kartasi hii?
1. ndiyo M3.14 2. hapana Kip. 4

3.14 Huyapata kartasi moja kwa jina?
1. ndiyo 2. hapana 8. hajui 9. hakuna jibu

3.15 Unaweza kuniambia kazi ya kartasi ya kipimo? Faida yake ni nini?
1. andika chindani 2. andika uzito ya mtoto 3. kujua afya
8. hajui 4. ingine (taja)

SEMA Sasa ninataka kukuoneshea ma kartasi ya watoto waingine, na kukuuliza maulizo. ONYESHA kwa mama ma kartasi: A B C

3.16 Kartasi A inaonyesha ya kama mtoto anaendelea vizuri ao haendelea vizuri?
1. anaendelea vizuri 2. hapana vizuri 8. hajui 9. hakuna jibu

3.17 Kartasi B inaonyesha ya kama mtoto anaendelea vizuri ao haendelea vizuri?
1. anaendelea vizuri 2. hapana vizuri 8. hajui 9. hakuna jibu

3.18 Kartasi C inaonyesha ya kama mtoto anaendelea vizuri ao haendelea vizuri?
1. vizuri 2. hapana vizuri 8. hajui 9. hakuna jibu

KAMA MAMA ANASEMA KARTASI MOJA INAONYESHA MTOTO HAENDELEA VIZURI, ONYESHA TENA MARA MOJA KARTASI KWA MAMA NA UMUULIZA M3.19

3.19 Utafanya nini kwa mtoto kama haendelea vizuri?
1. dawa ya michango ya tumbo 2. dawa ya ugonjwa ingine
3. sombe 4. mayayi 5. kalanga 6. samaki/nyama
7. ona munganga 8. hajui 9. hakuna jibu 0. ingine (taja)

KIPANDE 4. CHAKULA

4.1 Mtoto wa miaka 1 ao 2 anahitaji kula mara ngapi kila siku?
1. mara 2 2. mara 3 3. mara 4 4. >4

4.2 Karibu miaka ngapi mtoto wako anaanja kula... (karipia)

Chakula	0-4 mwezi	5-8 mwezi	9-12 mwezi	>12	Hakuna jibu
a. bui					
b. matunda					
c. mboga					
d. mahalaki					
e. nyama/samaki					
f. mayayi					
g. maziwa ya ngombe					

4.3 Unaweza kuniambia "Jina" alikula mara ngapi jana?
1. mara moja 2. mbili 3. tatu 4. ine ao zaidi 8. hajui

4.4 Jana ulimaliza wakati murefu kwako ao ulitoka na kutembea, ndiyo kusema ulimaliza saa murefu fwasi ingine?
1. mungine 2. nilitoka

4.5 Ulimupatia nini jana kwa kula?
mara moja ____________
mbili ____________
tatu ____________
ine ____________

KIPANDE 5. KUHARA

5.1 Kwa mara ya mwisho wakati mtoto wako alipoongonjwa, ulifanya nini? (nyuma ya majibu ULIZA ingine kama iko)
1. hayahara M5.3 2. ona munganga M5.3 3. mayi sana M5.3
4. kuchemusa maji M5.3 5. chumvi M5.2 6. sukari M5.2
7. sachet SE M5.2 8. ingine (taja) M5.3

5.2 Namna gani unafanya yale dawa?

5.3 Ni vitu gani inaweza kuleta kuhara? (Nyuma ya jibu, ULIZA vitu vingine kama iko)
1. mikono ya mama muchafu 2. mikono ya mtoto muchafu
3. maji chafu 4. sahani muchafu 5. kuwa na musalani muchafu
6. chakula bila mufuniko 8. hajui 7. ingine (taja)

5.4 Kama mtoto wako iko mugonjwa na hapendi kula, ulikua unagonjawe na hamu ya kula ao ulikua unafanya kitu kingine kwa chakula (nyuma ya majibu ULIZA ingine kama iko)
1. hakuna, kuongonja 2. kumupa nguvu kwa kula 3. kumupa anavyoitaji 4. kunyonyesha peke 5. kumupa chakula ya kawaida (taja) 6. ona munganga 7. lavement 0. ingine (taja)

KIPANDE 6. UTARATIBU WA MUNGINI

6.1 Kwa juma ya mwisho, ulikuwa ndani siku usipoikala mungine (kwako) kwa kipande kubwa ya saa, ndiyo kusema unatoka asubui na kurudi nyuma ya saa sita kwa kwenda kwa soko ao kwa shamba ao...
6.1 ndiyo M6.2   2. hapana M6.3   8. hajui M6.3

6.2 Siku ngapi ulitoka saa vile, kwa kipande kubwa ya saa, kwa juma ya mwisho?
1. 1-2 siku 2. 3-4 3. 5-6 4. >6 9. hakuna jibu

6.3 Kutoka iko kwako kama desturi, ao ulitoka juma hii pekee?
1. desturi   2. pekee

6.4 Kama unatoka kipande murefu, unakamataka "Jina" ao unamuachaka mungini?
1. anakamataka Kip 7 2. anaachaka M6.5 3. yote mbili M6.5

6.5 Kamamwingini mwenye anapakiaka na "Jina" kwa mungine kama huko pale? Nani?
1. hakuna mtu Kip 7 2. mama mukuu Kip 7 3. mama mdogo ao sangazi Kip 7 4. bwana Kip 7 5. bibi mwingine Kip 7
6. mtoto wa kwanza M6.6 9. hakuna jibu Kip 7 8.ingine (taja) Kip 7

6.6 Miaka ngapi ana mtoto wa kwanza?

KIPANDE 7. MAISHA YA AKIBA

7.1 Unalima nini? (karipia)
muhogo viazi ndizi muchele kalanga mahalaki mboga soja ingine

7.2 Kama unakomelesa chakula, unakulaka kipande mukubwa ao unaozisha kipande mukubwa?
1. kukula   2. kuuzisha

7.3 Una vitu ya kufuga kama nyama?
1. mbuzi M7.4 2. ngombe M7.5 3. nguruwe M7.6 4. kuku M7.6

7.4 Yako kabisa ni ngapi? (mbuzi)

7.5 Yako kabisa ni ngapi? (ngombe)

7.6 Unatumia nini kuona usiku?
1. matete 2. katadoba 3. tala 4. torche

OBSERVER ET COCHER UNE REPONSE POUR CHAQUE PARTIE DE LA MAISON

Toit	1. nyasi 2. manjanja
Mur	1. nyasi/matete 2. potopoto 3. ciment, maibo, matafwali
Plancher	1. udongo 2. ciment inachangwa ao maibo 3. ciment
Porte	1. matete 2. rideau 3. mbao
Cuisine	1. ndiyo 2. nyumbani

KIPANDE 8. KIPIMO YA WATOTO CHINI YA MIAKA 5

Numero	Nom	Date de Naissance	Bras (mm)	Kg. (cm)	Taille

DIRE LES RESULTATS DE LA MENSURATION A LA MERE MAIS DIRE QU'ELLE DOIT ALLER AU KILO COMME D'HABITUDE
DEMANDER SI LA MERE A DES QUESTIONS
DIRE MERCI

PART 9 INFORMATION FROM GROWTH CHART
Name of the child
Child's Number Date of birth

Age	Kg	Age	Kg	Age	Kg	Age	Kg	Age	Kg
0		12		24		36		48	
1	______	13	______	25	______	37	______	49	______
2	______	14	______	26	______	38	______	50	______
3	______	15	______	27	______	39	______	51	______
4	______	16	______	28	______	40	______	52	______
5	______	17	______	29	______	41	______	53	______
6	______	18	______	30	______	42	______	54	______
7	______	19	______	31	______	43	______	55	______
8	______	20	______	32	______	44	______	56	______
9	______	21	______	33	______	45	______	57	______
10	______	22	______	34	______	46	______	58	______
11	______	23	______	35	______	47	______	59	______

Yellow/Orange Card Zaire chart	Tick if completed Cross if not completed	Pink Card Road to Health chart

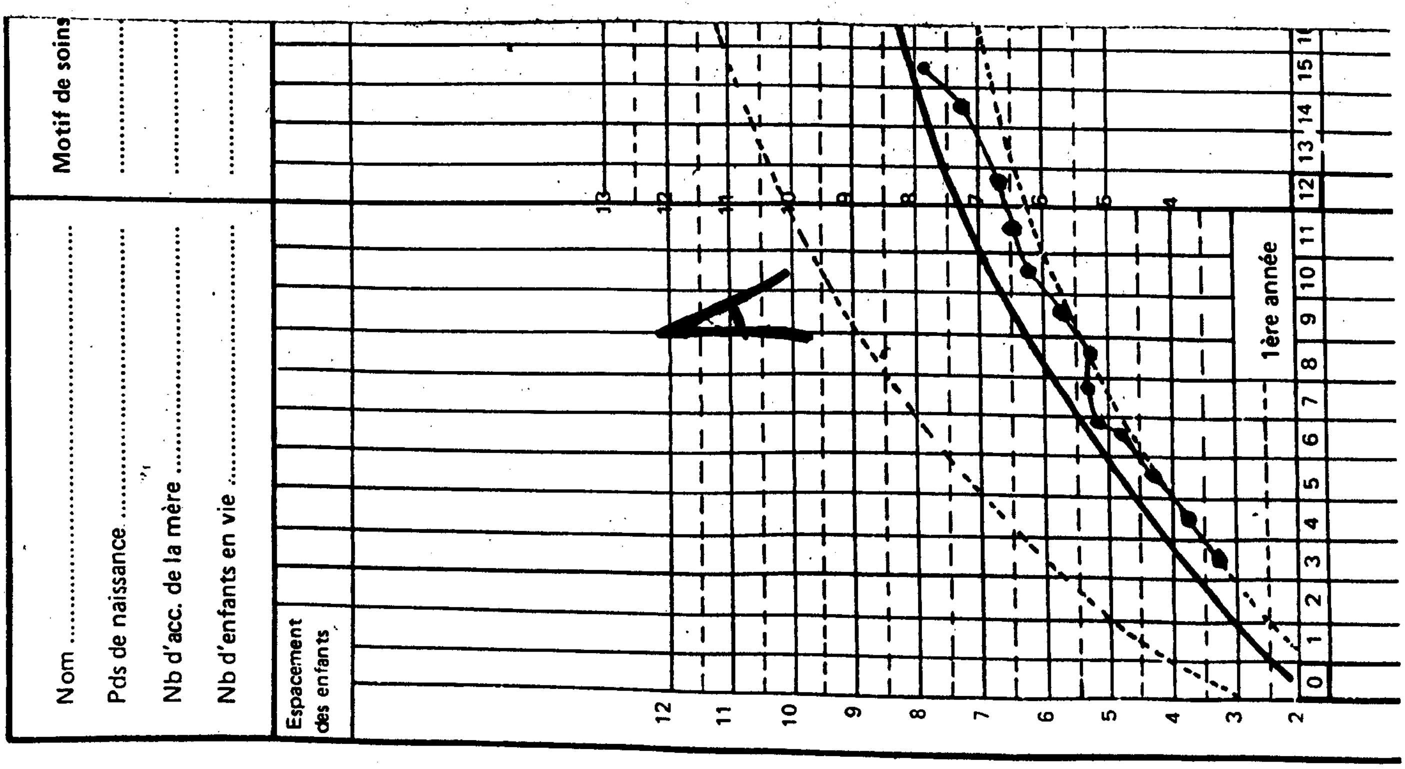
Child's number	Name of health centre
Name of health centre	Child's number
Child's name	Child's name
Sex	Sex
Date of birth	Mother's name
Parents' names	Father's name
Address	Date of birth
Number of deliveries by mother	Siblings
Number of children still living	

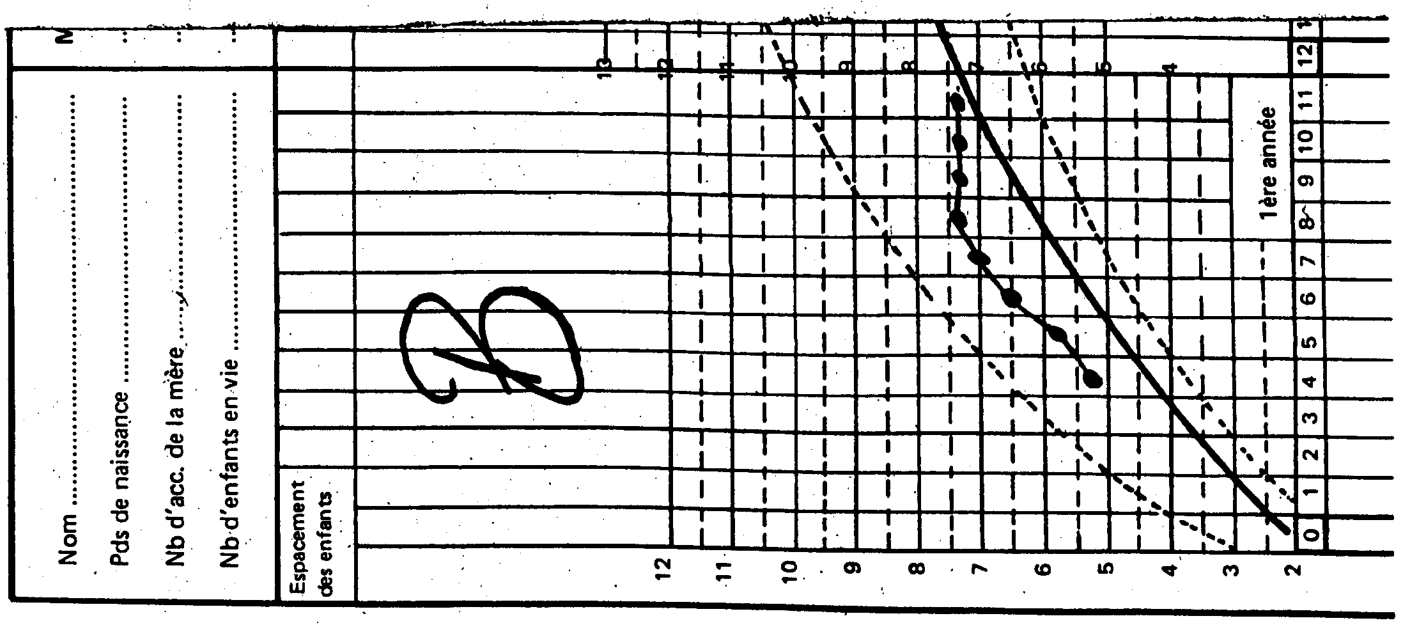
Vaccines
BCG
DPT (number of doses)
Polio (number of doses)
Measles
Birthday months filled in?
Month completed for each weighing?
Errors? 1. no 2. yes
Reasons for special care (write)

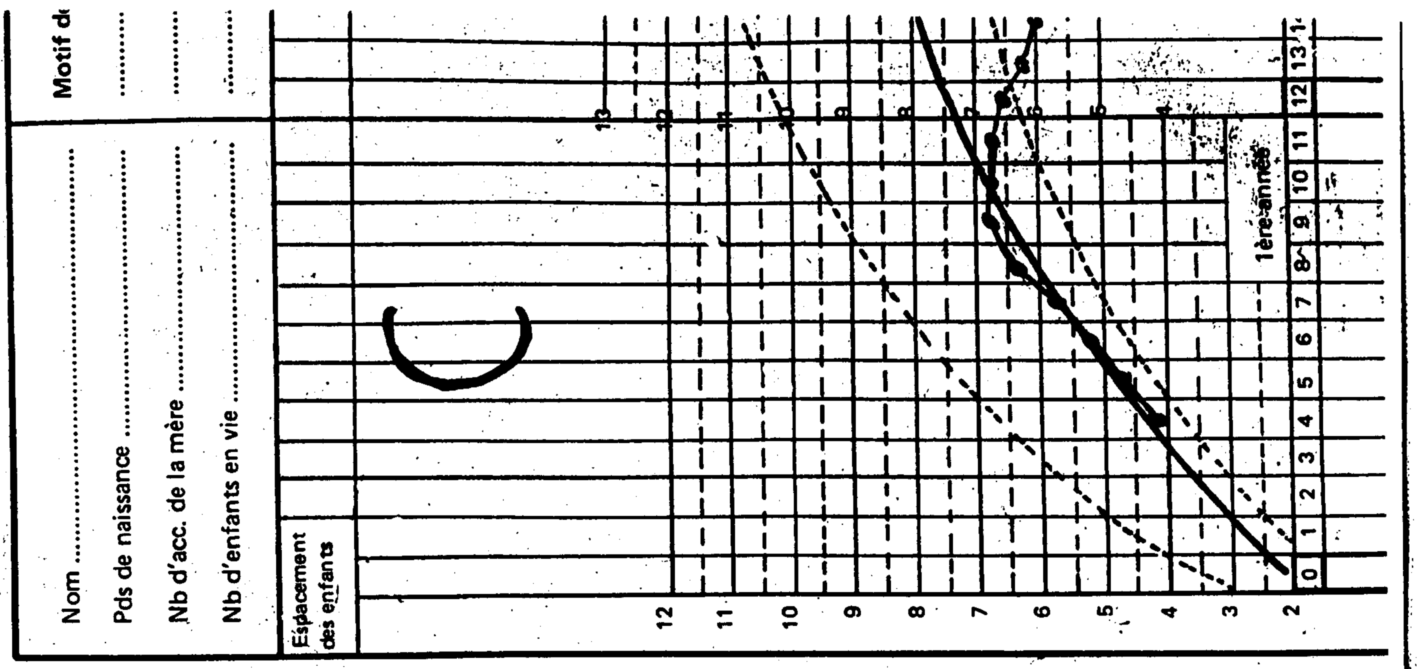
APPENDIX D

SAMPLE GROWTH CHARTS USED IN COMMUNITY SURVEY

Three growth charts, called A, B and C, were prepared by marking on them a number of weights which indicated different growth trends. The portion of the charts with the weights marked on them is reproduced here. The charts were shown one at a time to the mothers, who were asked to say if the weight lines indicated a child who was growing well or not growing well.


Motif de soins
Nom
Pds de naissance
Nb d'acc. de la mère
Nb d'enfants en vie
Espacement des enfants
1ère année
A


Nom
Pds de naissance
Nb d'acc. de la mère
Nb d'enfants en vie
Espacement des enfants
1ère année
B


Motif de
Nom
Pds de naissance
Nb d'acc. de la mère
Nb d'enfants en vie
Espacement des enfants
1ère année
C

APPENDIX E

LETTER FROM MEDICAL DIRECTOR OF KATANA HEALTH ZONE

(original in French; translated by author)

Evaluation and Reorganization of the Child Health Clinic

In August 1987, we benefited from the presence of a Canadian nurse (Nancy Gerein) who was interested in growth monitoring, by conducting an evaluation of our child health programme. The systematic observations of the sessions by Ms. Gerein and our nurse-supervisor resulted in the following conclusion:

--a long waiting time for mothers in order to receive only a few minutes of attention for each child

--the time allocated to well children was the same as that for unwell children

--correct weighing technique overall

--mistakes in recording information on the growth chart (forgetting to write in the months between visits)

--variable interpretation of weight gain, often incorrect

--the quality of the clinical examination and interpretation of diagnostic information about the same for both categories of health personnel (ie."good" and "poor" among both auxiliaries and nurses)

Based on these results, we have decided to reorganize the sessions using a system of triage which will be done by the auxiliaries, so that the nurse will see only those children with problems and can devote more time to them.

The principles of the triage system were taught to the auxiliaries in a 2-day refresher training course in groups of 20-25, with both paper exercises and practical exercises during a child health session.

1. Correct recording on the growth chart (diagnosis, age...)

2. Interpretation of the weight using weight gain per month compared to a normal weight gain per month for the child's age (mathematical method instead of graphic)

3. Rules of triage:
   -new "at-risk" cases (birth weight less than 2500 gm, twins, more than one-third of siblings dead, child being raised by other than his natural mother, child born before the previous child is 3 years of age, chronic illness)

   -all children whose weight has declined

-children under one year of age with insufficient weight gain

-children over one year whose weight is stationary for more than two months

-children who have been hospitalized since the last session

-all children complaining of illness

4. Send home directly all children with no problems; give a three month holiday to children over three years of age with no problems

5. Send directly for immunization children without problems; warn the mothers to come later during the session so as to avoid waiting

After several months of experience, this system has reduced the time taken at sessions by two hours per session for the staff and mothers. However, the number of children to be seen by the nurse is still very high (about 40% of the total attending) and more strict criteria may have to be devised after another evaluation

The nurses were also given refresher training in the system of triage, which they must supervise, as well as in the interventions to be applied to growth faltering. A weekly consultation, called "intensive weight surveillance" was organized and children were put into three groups according to the cause of growth faltering: repeated fever, repeated diarrhoea, nutritional problems (insufficient lactation or weaning). During these weekly consultations, the weight of the child was measured, a specific educational message was given, and commodities were sold or distributed (anti-malarial drugs, ORS, soyaflour, soya biscuits). An evaluation will be carried out after one year of implementation.